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25 April 2003

Mr. Mohammed Zaidi, R.G.
California Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Subject: *Redevelopment Remedial Action Plan* and *Risk Management Plan* for the Price Pfister Property, 13500 Paxton Street, Pacoima, California (EKI A20034.03)

Dear Mr. Zaidi:

On behalf of Price Pfister, Inc., Erler & Kalinowski, Inc. ("EKI") is pleased to submit the enclosed *Redevelopment Remedial Action Plan* ("RAP") for 13500 Paxton Street in Pacoima, California, dated 25 April 2003. Also, enclosed is the *Risk Management Plan*, which is incorporated as Appendix A of the RAP. These documents recommend remedial actions and protocols to address the presence of chemicals of concern at the Price Pfister property as described in the *Remedial Investigation Report* by EKI, dated 7 February 2003.

On behalf of Price Pfister, EKI requests that the Regional Board review and approve these documents. Please contact us if you have any comments or questions regarding the information provided herein.

Very truly yours,

ERLER & KALINOWSKI, INC.

Steven G. Miller, P.E.
Project Manager

REGISTERED PROFESSIONAL ENGINEER
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EKI

REDEVELOPMENT
REMEDIAL ACTION PLAN

13500 Paxton Street, Pacoima, California

Prepared for:

Price Pfister, Inc.

25 April 2003

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

LIST OF TABLES

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

LIST OF TABLES

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

LIST OF FIGURES

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

LIST OF FIGURES

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

LIST OF APPENDICES

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

LIST OF ABBREVIATIONS AND ACRONYMS

1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
1,1,1-TCA	1,1,1-trichloroethane
1,2-DCA	1,2-dichloroethane
AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
AST	above ground storage tank
CAA	Clean Air Act
Cal/EPA	State of California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
cis-1,2-DCE	cis-1,2-dichloroethene
COC	chemical of concern
CWA	Clean Water Act
EKI	Erler & Kalinowski, Inc.
FHP	free hydrocarbon product
FS	feasibility study
ft bgs	feet below ground surface
ft msl	feet above mean sea level
HI	hazard index
Holchem/Brenntag	Holchem, Inc./Brenntag West, Inc.
hp	horsepower
HSC	Health and Safety Code

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

LIST OF ABBREVIATIONS AND ACRONYMS

IAS	in-situ air sparging
LDR	land disposal restriction
Lead Spread	Lead Spread Version 7.0 computer model
MCL	Maximum Contaminant Level
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OEHHA	Office of Environmental Health Hazard Assessment
PCE	tetrachloroethene
PEA/SI	Preliminary Endangerment Assessment/Site Inspection
POTW	publicly owned treatment works
PRG	preliminary remediation goal
Price Pfister	Price Pfister, Inc.
RAO	remedial action objective
RAP	Remedial Action Plan
RBSL	risk-based screening level
RC	representative concentration
RCRA	Resource Conservation and Recovery Act
RG_c	remediation goal based on carcinogenic effects
RG_{nc}	remediation goal based on non-carcinogenic effects
RI	Remedial Investigation
RMP	Risk Management Plan
RWQCB	Regional Water Quality Control Board, Los Angeles Region
scfm	standard cubic feet per minute
Site	Price Pfister property located at 13500 Paxton Street, Pacoima, California

REDEVELOPMENT REMEDIAL ACTION PLAN

Price Pfister, Inc., Pacoima, California

LIST OF ABBREVIATIONS AND ACRONYMS

SSD	sub-slab depressurization system
SVE	soil vapor extraction
TBC	to-be-considered materials
TCE	trichloroethene
TSCA	Toxic Substances Control Act
µg/dl	microgram per deciliter
µg/L	microgram per liter
UCL	upper confidence limit
UST	underground storage tank
VOC	volatile organic compound
WWTS	wastewater treatment system

1. EXECUTIVE SUMMARY

Erler & Kalinowski, Inc. ("EKI") prepared this Redevelopment Remedial Action Plan ("RAP") on behalf of Price Pfister, Inc. ("Price Pfister") for the property located at 13500 Paxton Street in Pacoima, California ("Site"). The purpose of this RAP is to evaluate a range of remedial actions for sources of contamination at the Site that have been identified in the Remedial Investigation ("RI") report (EKI, 2003) and to recommend specific remedial actions for the Site. The recommended remedial actions are intended to be flexible to accommodate various approaches for redeveloping the Price Pfister property while still safeguarding human health and the environment. Price Pfister will be conducting additional groundwater investigation at and near the Site. If, as a result of those additional investigations, it is determined that additional remedial actions might be warranted, the need for such remedial actions will be evaluated.

Current Remedial Actions

Current remedial actions are focused on enhancing the control and removal of volatile organic compounds ("VOCs") in soil and groundwater at the Central Building P Area and Oil Staging Area, and collection of free hydrocarbon product ("FHP") as oils on groundwater at the Building A Area. VOCs in soil will continued to be addressed by operating the existing soil vapor extraction ("SVE") systems at the Central Building P Area and Oil Staging Area. VOCs that migrated in soil vapor and dissolved in groundwater at these areas of concern ("AOCs") will be remediated by in-situ air sparging ("IAS"); the IAS systems are being installed at present. Wells PMW-16, PMW-17, and PMW-18 will be connected to the FHP collection system at the Building A Area that presently consists of wells MW-1, MW-2, and MW-3. Figure ES-1 depicts the approximate layouts of the SVE/IAS systems at the Central Building P Area and Oil Staging Area, and FHP collection system at the Building A Area.

Additional Remedial Actions Contingent upon Redevelopment

Remedial actions contingent upon redevelopment of the Price Pfister property include excavating non-VOC sources (i.e., petroleum hydrocarbons as oils, metals and cyanide, semi-volatile organic compounds) in soil from the Central Building P Area, Building A Area, Oil Staging Area, and Building L Area and disposing of the resulting soil at an off-site, permitted waste management facility. Excavation will be conducted to remove non-VOC sources in soil unless final Site elevations planned as part of redevelopment call for covering the non-VOC sources with clean soil that would adequately limit direct contact with the contamination. If performed, excavation will be limited to soil within the upper 3 feet of the Site because soil in the upper 3 feet of the Site is the material most likely to be contacted by maintenance workers or other individuals (e.g., gardeners, plumbers, electricians) that are not likely to be health and safety trained.

Since existing buildings and improvements must be removed to access contaminated soil, excavation of non-VOC sources will be performed as existing buildings and improvements are demolished during redevelopment of the Site. In the interim, protocols specified in the Risk Management Plan ("RMP") will be followed to ensure that cover at the Site remains intact, and individuals that may dig below the cover at the AOCs will be informed of the nature and extent of non-VOCs in soil and will be appropriately health and safety trained.

In addition, the decision to halt SVE, IAS, and/or FHP collection will depend upon when Site redevelopment takes place. To the extent that these operations are needed after redevelopment, replacement systems may be installed and operated after redevelopment. Figure ES-2 depicts the locations of remedial actions contingent upon redevelopment.

RMP Protocols

The RMP is a component of the recommended remedial actions and includes protocols for conducting inspections, performing sampling if suspected soil contamination is encountered, maintaining institutional controls, and fulfilling reporting obligations. RMP protocols when used in conjunction with the other recommended remedial actions will protect potentially exposed populations before, during, and after redevelopment of the Site. The RMP requires that existing cover over the entire Site be maintained until it is replaced with new buildings or other improvements constructed as part of redevelopment of the Site and that this new cover be maintained. The requirement to keep the Site covered arises from the need to isolate non-VOC sources in soil until they are excavated and to protect against the possibility that undiscovered contamination might exist at other Site locations.

The RMP provides that a sub-slab depressurization system ("SSD"), SVE, or equally effective measures may need to be instituted to protect building tenants at the Site from the potential vapor intrusion exposure pathway. Vapor intrusion may remain a concern after completing SVE and IAS because VOCs are emanating in groundwater from the Holchem/Brenntag West, Inc. ("Holchem/Brenntag") facility and possibly other nearby facilities. Until VOC sources at the Holchem/Brenntag facility and elsewhere are remediated or controlled, VOCs in groundwater will continue to be transported to the

Price Pfister property where VOCs can volatilize from groundwater and migrate through soil gas into air inside buildings at the Site.

Monitoring

Monitoring will include soil vapor and groundwater sampling to assess the performance of SVE and IAS at the Central Building P Area and Oil Staging Area, and measurements of FHP thickness in wells to assess the performance of FHP collection at the Building A Area.

Land Use Restrictions

Land use of the Site will be restricted to industrial and commercial purposes and use of groundwater beneath the Site for any purpose will be prohibited.

2. INTRODUCTION

Erler & Kalinowski, Inc. ("EKI") has prepared this Redevelopment Remedial Action Plan ("RAP") on behalf of Price Pfister, Inc. ("Price Pfister") for the property located at 13500 Paxton Street in Pacoima, California ("Site"). Figure 1 depicts the Site and its surroundings.

The State of California Environmental Protection Agency ("Cal/EPA"), Regional Water Quality Control Board, Los Angeles Region, ("RWQCB") is the lead regulatory agency responsible for overseeing implementation of the RAP for the Site. This RAP has been prepared consistent with requirements for preparing a RAP under Section 25356.1 of Chapter 6.8 of the State of California Health and Safety Code ("HSC") including as referenced therein the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), set forth in Part 300, Title 40 of the Code of Federal Regulations ("CFR"). Upon approval, this RAP will set forth the remediation program that must be implemented at the Price Pfister property to satisfy applicable State of California requirements.

The purpose of this RAP is to evaluate a range of remedial actions for sources of contamination at the Site that have been identified in the Remedial Investigation ("RI") report (EKI, 2003) and to recommend specific remedial actions for the Site. The recommended remedial actions are intended to be flexible to accommodate various approaches for redeveloping the Price Pfister property while still safeguarding human health and the environment. Remaining sections of the RAP present the following:

- Section 3, Site Background, provides a synopsis of the regional setting, description of surface features at and near the Price Pfister property, and summarizes the Site use history, and local geology and hydrogeology.

- Section 4, Overview of Investigative Findings and Removal Actions, summarizes the findings of the RI and previous investigations, and describes removal actions currently being performed by Price Pfister to address contaminated media identified at the Site.

- Section 5, Applicable or Relevant and Appropriate Requirements ("ARARs"), evaluates environmental laws and regulations that may be pertinent to remedial actions to be implemented at the Site.

- Section 6, Remedial Action Objectives ("RAOs"), describes what the remedial actions at the Price Pfister property should accomplish to be protective of human health and the environment.

- Section 7, Remediation Goals, provides numerical criteria that are intended to assist with determining when remedial actions have met the RAOs.

- Section 8, Identification and Screening of Technologies, evaluates potentially suitable technologies for incorporation into remedial alternatives designed to achieve the RAOs.

- Section 9, Potential Remedial Alternatives, describes the remedial alternatives that are considered in this RAP.

- Section 10, Detailed Analysis of Potential Remedial Alternatives, recommends remedial actions after comparing the remedial alternatives against the nine evaluation criteria contained in the NCP and the six factors that must be taken into account when preparing a RAP under the State of California HSC.

- Section 11, Remedial Action Plan, describes the recommended remedial actions and establishes the schedule for their implementation.

- Section 12, References, lists the sources of information cited in this report.

3. SITE BACKGROUND

This section provides background information on the Price Pfister property. Included in this section is a synopsis of the regional setting, description of surface features at and near the Site, and summaries of the use history, geology, and hydrogeology of the Price Pfister property. The RI report (EKI, 2003b) for the Price Pfister property provides additional information on the Site background.

3.1 REGIONAL SETTING

The Price Pfister property is located in the northeastern portion of the San Fernando Valley. The area south of the Site is residential; areas to the north, east, and west of the Site are primarily industrial and commercial. Chemical releases at nearby industrial and commercial facilities have resulted in volatile organic compound ("VOC") contamination of groundwater. Of particular interest is the Holchem/Brenntag West, Inc. facility ("Holchem/Brenntag"), which is in the upgradient direction of groundwater flow from the Price Pfister property. The Holchem/Brenntag facility was used for storage and distribution of chemicals. Chlorinated and non-chlorinated VOCs released at the Holchem/Brenntag facility have migrated in groundwater beneath the Price Pfister property. Figure 2 depicts the migration of tetrachloroethene ("PCE") in groundwater from the Holchem/Brenntag facility. Other VOCs in groundwater that have migrated onto the Price Pfister property are illustrated on additional figures included in the RI report.

The Holchem/Brenntag facility is contributing to concentrations of PCE, trichloroethene ("TCE"), and 1,1,1-trichloroethane ("1,1,1-TCA") detected in groundwater at the Price Pfister property. In addition, several other VOCs, including cis-1,2-dichloroethene ("cis-1,2-DCE"), 1,1-dichloroethane ("1,1-DCA"), and 1,2-dichloroethane ("1,2-DCA") found in groundwater at the Holchem/Brenntag facility continue to migrate onto the Price Pfister property. Cis-1,2-DCE and 1,1-DCA are degradation products that are formed by microorganisms under anaerobic (i.e., lack of oxygen) conditions. These degradation products originate from the Holchem/Brenntag facility because they could not have been formed under the aerobic (i.e., presence of oxygen) conditions that exist at the Price Pfister property. ARCADIS (2002) states that biological degradation of chemicals such as acetone, methyl ethyl ketone, and methyl isobutyl ketone, released to groundwater at the Holchem/Brenntag facility are causing the anaerobic degradation of PCE and TCE and formation of cis-1,2-DCE and 1,1-DCA.

3.2 SURFACE FEATURES

The Price Pfister property occupies approximately 25 acres and is bounded by Paxton Street to the north, Louvre Street to the south, Sutter Avenue to the west, and Bradley Avenue to the east. Several buildings occupy the Site. The remaining area is surfaced with asphalt or concrete except for small areas of landscaping around Building O. As a consequence, no significant ecological habitats exist at the Site. Building P, the largest building on the premises, covers approximately 8.5 acres on the central portion of the Site (Figure 3). A parking lot is located north of Building P and extends along Paxton Street between Sutter Street and Bradley Avenue. Smaller buildings are located around the perimeter of the Site. An out-of-service railroad spur runs along the southern side of Building P. The Site is fenced and has several gated entrances.

The ground surface elevation at the northern boundary of the Site along Paxton Street is approximately 1,050 feet above mean sea level ("ft msl") at monitoring well A1. The ground surface elevation drops approximately 20 feet across the Site to the south. The elevation of monitoring well PMW-13, constructed in the southwest corner of the Site near Sutter Street and Louvre Street, is approximately 1,030 ft msl. The elevation difference between these two wells indicates a grade change of approximately 1.4 percent.

No surface water bodies exist at or adjacent to the Site. The nearest surface drainages are the Pacoima Wash and Pacoima Diversion Channel. The Pacoima Wash is located approximately 0.6 miles north and west of the Site. The Pacoima Diversion channel is located approximately 1.5 miles southwest of the Site.

3.3 SITE USE HISTORY

Plumbing products were manufactured at the Price Pfister property from approximately the mid-1950s to the end of 2002. Price Pfister has owned and operated the Site since 1983. As of April 2003, the only commercial operations being performed by Price Pfister at the Site relate to warehousing and shipping finished products. Price Pfister has decontaminated areas of the Site where chemicals were handled or stored, and completed removal of manufacturing equipment from the Site under the supervision of the County of Los Angeles Fire Department. Price Pfister is awaiting approval of these activities by the County of Los Angeles Fire Department.

Review of historical aerial photographs and architectural drawings indicates that improvement of the Price Pfister property began sometime between 1949 and 1952 with construction of Building J. Buildings were added or expanded, and the Site was gradually paved between 1954 and 1995.

3.3.1 Chemicals Employed in Manufacturing Operations

Site operations have included foundry and die casting, machining, polishing, degreasing, powder coating, electroplating, plastic injection molding, assembly, and other operations associated with the manufacturing of plumbing products (Price Pfister, 1995). The primary chemicals used in these operations included PCE, 1,1,1-TCA, aqueous based detergents, petroleum naphtha, cutting oil, hydraulic oil, linseed oil, kerosene, hexavalent chromium, copper, lead, nickel, tin, zinc, acid and alkaline solutions, cyanide, sodium hypochlorite, and sodium metabisulfite. The chemicals were employed for a variety of purposes, including casting, electroplating, machining, metal degreasing, and wastewater treatment.

3.3.2 Wastes Historically Generated by Manufacturing Operations

Price Pfister generated wastes that were classified as hazardous under the Resource Conservation and Recovery Act ("RCRA"), and wastes that were considered hazardous based upon criteria specific to the State of California, which are commonly referred to as "non-RCRA" hazardous wastes. Historically generated RCRA hazardous wastes consisted of electroplating wastewater filter cake (RCRA waste code F006), spent chlorinated solvents (RCRA waste code F002), used refractory brick (RCRA waste code D008), and spent petroleum naphtha (RCRA waste code D001) (Price Pfister, 1995). Historically generated non-RCRA hazardous wastes consisted of buffing lint, oil-containing sorbent material, oily water emulsions, and used oil (Price Pfister, 1995). RCRA and non-RCRA hazardous wastes were transported to off-Site, permitted waste management facilities for treatment and disposal. Spent casting sand and metal-containing baghouse dust from the foundry, and metal chips and shavings produced by machining were classified as excluded recyclable materials and were sent to off-Site, metal reclamation facilities.

3.3.3 Chemical Product and Waste Handling and Storage

Chemical products or wastes were stored in various containers that included roll-off bins, drums, waterproof sacks, and above ground storage tanks ("ASTs"). Between 1954 and 1989, petroleum products and used oil were also kept in ten underground storage tanks ("USTs"). All of the ASTs and USTs have been removed from the Site. Historical chemical handling occurred in the Central Building P Area, Building A Area, Oil Staging Area, and Building L Area. The locations of these areas are shown on Figure 3. The RI report explains in greater detail the uses of the Central Building P Area, Building A Area, Oil Staging Area, and Building L Area, and describes the nature and extent of chemicals at these areas. Uses of other locations at the Site also are addressed in the RI report.

3.3.4 UST Closure Status

Regulatory agency closure has been received for three of the ten former USTs. Implementation of the RAP for the Site as approved by RWQCB is proposed to constitute regulatory agency closure of the seven former USTs for which formal closure has not been received.

3.4 LOCAL GEOLOGY AND HYDROGEOLOGY

Geologic and hydrogeologic conditions at the Price Pfister property are described in Sections 3.4.1 and 3.4.2.

3.4.1 Site Geologic Conditions

Soil beneath the Site consists of well-graded sandy gravels and gravelly sands with only minor percentages of silt and clay. The soil has low moisture content as buildings and paving covering the Price Pfister property restrict surface water infiltration.

3.4.2 Site Hydrogeologic Conditions

Groundwater is encountered at a depth of approximately 50 to 60 feet below ground surface ("ft bgs") throughout the majority of the Site and the groundwater flow direction is generally to the southeast. However, several faults, which may be potential splays of the Verdugo Fault, cause groundwater levels along the southern boundary of the Price Pfister property to drop abruptly by approximately 20 feet and groundwater along the southern boundary of the Site is encountered at approximately 70 ft bgs. The groundwater flow direction changes to the southwest near Louvre Street.

The abrupt decline in groundwater levels and change in groundwater flow direction along the southern boundary of the Price Pfister property reflects the influences of groundwater barriers that exist within the subsurface. The groundwater barriers are the result of faulting that has created clay-filled shear and clay gouge zones that restrict groundwater flow. The faults do not extend to ground surface or even to the top of the saturated zone because they are concealed by the deposition of additional alluvial deposits. This stratigraphy appears to result in groundwater cascades whereby groundwater spills over the top of the faults. Figures 4 and 5 illustrate the groundwater cascades at the Site in plan- and cross-section views.

The faults also influence the magnitude of horizontal and vertical groundwater gradients across the Site and cause the direction of groundwater flow to change from a southeasterly to a southwesterly direction near Louvre Street. The fact that the faults act as a barrier may explain the upward vertical groundwater gradient observed in monitoring wells MW-5 and PMW-21B, which are situated near the faults along the southern boundary of the Price Pfister property. Deeper groundwater that encounters the faults cannot easily pass through the low permeability clay-filled shear and clay gouge zones. The groundwater is forced to rise up the faults until it reaches the alluvial deposits and spills over the faults as groundwater cascades. The upward vertical groundwater gradients are evidence supporting the notion that the faults cause upward groundwater flow.

4. OVERVIEW OF INVESTIGATIVE FINDINGS AND REMOVAL ACTIONS

Previous environmental investigations performed at the Price Pfister property included soil sampling related to removal of the ten USTs, completion of a Preliminary Endangerment Assessment/Site Inspection ("PEA/SI") by Cal/EPA, Department of Toxic Substances Control, performance of a Phase I Environmental Site Assessment, and sampling of shallow soil at selected locations at the Site. The previous investigations revealed the following:

- VOCs, consisting primarily of PCE, were detected in soil in the Central Building P Area, Building A Area, and the Oil Staging Area.
- Petroleum hydrocarbons as oils were detected in soil and free hydrocarbon product ("FHP") on groundwater in monitoring well MW-1 at the Building A Area.
- PCE, 1,1,1-TCA, TCE, 1,1-dichloroethene ("1,1-DCE"), cis-1,2-DCE, and other VOCs were detected in groundwater on the northwestern portion of the Site in the up-gradient direction of groundwater flow.

The RI built upon the findings from previous investigations and was performed in a step-wise fashion from March 2002 through January 2003. The RI identified chemical source areas at the Site and characterized the distribution of chemicals in soil, soil gas, and groundwater originating from these sources. Quarterly groundwater sampling of monitoring wells constructed at the Site was initiated during the RI. Investigation of groundwater at and near the Price Pfister property is continuing.

4.1 CHEMICALS OF CONCERN

Chemicals detected in soil, soil gas, and groundwater samples collected from the Price Pfister property were examined in the RI report to identify chemicals of concern ("COCs"). COCs are chemicals that are determined to possibly pose a threat to human health and the environment at a given site. Chemicals detected in environmental media at the Site were not retained as COCs if they are: (1) present at ambient or background concentrations in soil or (2) infrequently detected and do not pose a human health or environmental hazard.

COCs for the Price Pfister property consist of the following VOCs and non-VOCs:

Identified COCs for Price Pfister Property

VOCs	
Primary VOCs	Secondary VOCs
• PCE • 1,1,1-TCA • TCE • cis-1,2-DCE • 1,1-DCE	• 1,1-DCA • 1,2-DCA • trans-1,2-dichlorethene • Bromomethane • Chloroform • Trichlorofluoromethane • Vinyl Chloride • Benzene • Toluene • Ethylbenzene • Total Xylenes

Non-VOCs		
Petroleum Hydrocarbons	Metals and Cyanide	SVOCs
• TEPH	• Chromium • Hexavalent Chromium • Copper • Lead • Nickel • Zinc • Cyanide	• Chrysene • Phenanthrene • Pyrene

As noted in the tables above, VOCs at the Price Pfister property have been divided into primary VOCs and secondary VOCs. Primary VOCs consist of chlorinated solvents and degradation products of chlorinated solvents that are most commonly found in soil, soil gas, and groundwater at the Site. Secondary VOCs are VOCs that are found less frequently than primary VOCs in environmental media at the Price Pfister property. Significantly, other than PCE, most of the other primary VOCs, as well as secondary VOCs, are attributable to chemicals migrating from releases that occurred at Holchem/Brenntag or other nearby facilities. Non-VOCs consist of petroleum hydrocarbons and metals and cyanide that were employed in Price Pfister's manufacturing operations, and SVOCs that are associated with used black sand present at the Building L Area. The black sand is a by-product of Price Pfister's historical casting operations at the Site.

4.2 COC SOURCES

Investigations have identified COCs sources at four areas of the Price Pfister property. These areas of concern ("AOCs") consist of: (1) Central Building P Area, which housed degreasing, electroplating, and wastewater treatment operations, (2) Building A Area, which was used for screw machining, (3) Oil Staging Area, which was used for waste treatment operations and petroleum storage, and (4) the area next to the former foundry referred to as the Building L Area (Figure 3). Sections 4.2.1 through 4.2.4 summarize environmental conditions at the AOCs based upon the data presented in the RI report. Section 4.2.5 describes environmental conditions at other locations at the Site.

4.2.1 Central Building P Area

As shown on Figures 6 and 7, PCE appears to have been released in the vicinity of the former Baron vapor degreaser. Review of available data suggests that released liquid PCE sorbed completely to soil and did not enter groundwater as a liquid. The PCE in groundwater beneath the Central Building P Area that does not originate from off-Site chemical releases (e.g., Holchem/Brenntag facility) likely resulted from PCE that volatilized from residual liquid in the unsaturated zone and sank by gravity to the top of the saturated zone.

U.S. EPA (1993c, 1992b, 1991g) has suggested that gas phase advection may dominate the transport of VOCs from residual chlorinated solvent in high permeability soils, such as those found at the Price Pfister property. The vapor formed by evaporating chlorinated solvent has a density greater than ambient soil gas. This density difference results in advective gas flow. PCE at the concentrations detected in soil gas before beginning operation of the soil vapor extraction ("SVE") systems had a vapor density greater than air, so density driven flow of PCE was downward causing these VOCs to accumulate on top of the saturated zone and dissolve into groundwater. As described in Section 4.3.1, the SVE systems operating in the Central Building P Area and Oil Staging Area are presently recovering and controlling migration of VOCs in the unsaturated zone at the Price Pfister property.

A localized release of heavier molecular weight petroleum hydrocarbons characteristic of oils appears to have occurred near the clarifier within the plating line and wastewater treatment system ("WWTS") at the Central Building P Area. Figures 6 and 8 depict the lateral and vertical extents to which petroleum hydrocarbons in soil near the clarifier have been characterized. Metals have also been detected in soil within the plating line and WWTS. Except for hexavalent chromium, metals and petroleum hydrocarbons detected in soil within the plating line and WWTS have not been found in underlying groundwater. Unlike other metals, hexavalent chromium is soluble and has been measured in groundwater at concentrations up to 35 micrograms per liter ("μg/L") in monitoring well PMW-26 at the Price Pfister property. However, no significant source of hexavalent chromium in soil has been identified. Hexavalent chromium is generally not detected in groundwater samples obtained from monitoring wells (i.e., MW-4, MW-6, MW-7, MW-8, PMW-9, and PMW-13) downgradient of PMW-26. The decreased hexavalent chromium concentrations in groundwater downgradient of well PMW-26 suggest that the amount of hexavalent chromium in the vicinity of well PMW-26 are relatively small and that natural attenuation can be relied upon to address the low concentrations of hexavalent chromium detected in groundwater.

4.2.2 Building A Area

Petroleum hydrocarbons as oils have been discovered in soil at several places at Building A where petroleum hydrocarbons as oils were historically stored or handled. The plan and cross-section views of environmental conditions at the Building A Area (Figures 9 and 10) illustrate that the oils traveled through soil under their own weight and pooled as FHP on top of groundwater. The extent of FHP on groundwater is limited and is defined by the presence or absence of FHP in monitoring wells constructed at the Building A Area.

The limited extent of FHP results from the lack of mobility of the heavier molecular weight cutting or pale oil on groundwater. Petroleum hydrocarbons in pale oil used by Price Pfister have carbon chain lengths of C_{16} to C_{34}, which are consistent with the types of petroleum hydrocarbons found in lubricants and have a high viscosity and low solubility in water. Consequently, FHP at the Building A Area tends to be immobile and does not move as a separate phase or as dissolved constituents in groundwater. As discussed in Section 4.3.2, collection of FHP on groundwater was initiated in 1995 and continues to date.

4.2.3 Oil Staging Area

PCE is the primary COC at the Oil Staging Area. Higher PCE concentrations in soil and soil gas coincide with the general location of the containment sump, which received wastewater from the Drum Rinsing Unit. The distribution of PCE in soil gas (Figure 15) before beginning operation of the SVE systems indicates that PCE volatilized from chlorinated solvent released to the subsurface from the sump and subsequently migrated downward by density driven flow.

The maximum concentration of PCE detected in groundwater at the Oil Staging Area was 1,320 μg/L in groundwater samples collected from monitoring well PMW-11 in August 2002. Sampling conducted in January 2003 showed PCE in groundwater samples collected from well PMW-11 had declined to 395 μg/L. Sources of PCE in groundwater at the Oil Staging Area are believed to include PCE released at the Holchem/Brenntag facility that migrated in groundwater to the Price Pfister property as well as PCE vapor that migrated from impacted soil beneath the containment sump by density driven flow and subsequently dissolved into groundwater. The SVE system has substantially removed PCE vapor that migrated to the saturated zone at the Oil Staging Area.

In addition to PCE, minor quantities of petroleum hydrocarbons as oils may have been released to the subsurface from the containment sump. Oils were also detected in soil during the removal of four USTs from the area in 1984. Two of the USTs held hydraulic oil, and linseed oil, and used lubricating and cutting oils were held in the other two USTs. The USTs were removed before the Oil Staging Area was constructed in 1988. Available Site records are unclear whether oily soil near the UST was excavated and disposed prior to filling the UST excavation. Neither oils released from the containment sump or oils associated with the former USTs have affected groundwater in the Oil Staging Area.

4.2.4 Building L Area

Potential environmental concerns associated with the Building L area are not associated with former operations in Building L, but instead relate to black sand that was deposited in this area before Building L was constructed and asphalt or concrete pavement was installed. Several of the exploratory trenches and borings completed in the Building L Area during the RI revealed dark gray to black sands with minor amounts of brown sand immediately beneath the pavement. These discolored sands are collectively referred to as "black sand." Laboratory analysis of the black sand indicates that the sand often contains metals at concentrations that indicate it has been used as casting sand. The thickness of black sand ranges from approximately 1 inch immediately below the existing pavement in several trenches or borings to a maximum of approximately 18 inches below the pavement in trench T-8. Figures 13 and 14 depict the area believed to contain black sand and soil with metals or other COCs, including PCE, petroleum hydrocarbons, chrysene, phenanthrene, and pyrene. Black sand and COC-containing soil have not impacted groundwater at the Building L Area.

4.2.5 Other Site Locations

The phrase "other Site locations" refers to portions of the Site not included in the Central Building P Area, Building A Area, Oil Staging Area, and Building L Area. Chemical use was limited at other Site locations, and investigative findings do not indicate that significant chemical releases occurred in these areas. Although no significant chemical releases are known to have occurred, any minor soil contamination that may be discovered at other Site locations can be likely remediated relatively easily and cost effectively through implementation of a risk management plan ("RMP").

The RMP is analogous to an Operation and Maintenance Plan that is often prepared as part of remedial actions implemented under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"). The Operation and Maintenance Plan is a typical component of remedial actions and includes protocols for conducting inspections, performing routine sampling, maintaining institutional and engineering controls, and fulfilling reporting obligations (U.S. EPA, 2001c). The objectives and contents of the RMP are similar.

The RMP, which is included as Appendix A, is a component of the institutional controls associated with remedial actions in this RAP. The RMP for the Price Pfister property describes the health protective measures to be implemented in the future, during and after redevelopment, for identified COCs, land uses, and potential exposure pathways.

4.3 REMOVAL ACTIONS

Price Pfister initiated removal actions of VOCs and FHP in the subsurface at the Site. Removal actions being performed by Price Pfister entail recovering VOC vapors from the unsaturated zone at the Central Building P Area and Oil Staging Area, and skimming FHP from groundwater at the Building A Area.

4.3.1 SVE Systems

In August 2002, two SVE systems were constructed at the Site. One system was constructed at the Central Building P Area and the other was constructed at the Oil Staging Area. Both systems began operating in September 2002.

Four SVE wells (i.e., PSVE-1 through PSVE-4) were constructed at the Central Building P Area and three SVE wells (i.e., PSVE-5 through PSVE-7) were constructed at the Oil Staging Area. Except for well PSVE-3, SVE wells located at the Central Building P Area are screened from approximately 35 to 55 ft bgs. SVE well PSVE-3 is screened from approximately 33 to 48 feet bgs because encountered subsurface conditions preventing drilling below 48 ft bgs at this location. In the Oil Staging Area, SVE well PSVE-5 is screened from approximately 31 to 51 feet bgs, and SVE wells PSVE-6 and PSVE-7 are screened from approximately 35 to 55 feet bgs. Construction details of SVE wells are provided in Appendix A of the RI report.

Separate 10 horsepower ("hp") blowers are connected to the SVE wells in the Central Building P Area and Oil Staging Area. Each of these blowers has a capacity of 250 standard cubic feet per minute ("scfm") and recovers VOCs by imparting a vacuum to the wells. Extracted soil gas is treated at each area by conveying the soil gas through two 1,000-pound vapor-phase granular activated carbon contactors connected in series. Soil vapor monitoring wells and soil vapor/groundwater monitoring wells allow collection and analysis of soil gas samples to evaluate the performance of the SVE systems.

Analysis of soil gas samples collected from vapor monitoring wells reveal a dramatic decline in PCE concentrations in soil gas throughout the unsaturated zone over much of the Site (Figures 16) compared to PCE concentrations in soil gas before the SVE began operating (Figure 15). The SVE systems have also substantially reduced PCE vapor that accumulated on top of the saturated zone (Figures 17 and 18). The total mass of VOCs that has been recovered by the SVE systems as of April 2003 is approximately 1,800 pounds. Approximately 90 percent of this mass is PCE.

The SVE systems are therefore addressing the major source of VOC contamination at the Price Pfister property by producing conditions where residual liquid PCE is volatilized and subsequently captured by recovering PCE in soil gas. Removal of PCE in soil gas that derives from residual liquid PCE will benefit groundwater conditions by not only eliminating the contaminant source but by altering the phase equilibrium of the VOCs as well. As VOC concentrations in soil gas decline further, the phase equilibrium will shift and VOCs will begin to partition from groundwater to soil gas. VOCs that volatilize into soil gas from groundwater can be recovered by the SVE systems, which will serve to improve groundwater quality beneath the Site by reducing the mass of VOCs in groundwater.

4.3.2 FHP Collection System

FHP collection was initiated in late 1995 at groundwater monitoring well MW-1 and expanded when monitoring wells MW-2 and MW-3 were constructed in 1998 and converted to FHP collection wells. Clean Environment Equipment Model AP-4 airlift pumps are installed in each of these three wells. The pumps extract FHP and groundwater. The pump intakes are set at a depth of approximately 50 ft bgs, which is near the interface of FHP and groundwater in each of the wells. From 1995 to December 2002, approximately 5,300 gallons of FHP have been recovered from wells MW-1, MW-2, and MW-3.

5. APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

The release or threatened release of a hazardous substance into the environment provides the basis for all cleanups under Section 13304 of the California Water Code, Chapter 6.8 of the State of California HSC, and related National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") requirements under CERCLA. Congress established a risk-based threshold for cleanups at such sites that was protective of human health and the environment but still afforded significant flexibility in selecting and implementing response actions (U.S. EPA, 1998c). In the absence of numerical cleanup levels and management standards specific to CERCLA, U.S. EPA implemented a policy that remedial actions generally meet or surpass substantive requirements of existing environmental laws, including those laws that Congress had referenced to generate the list of hazardous substances.

The Code of Federal Regulations ("CFR"), at 40 CFR §300.430(f)(1)(i)(A), provides that releases of hazardous substances at a site be cleaned up to meet ARARs, unless circumstances for a waiver exist. ARARs are used in conjunction with risk-based remediation goals to establish cleanup levels as part of RAOs for a site. According to U.S. EPA (1991d), "ARARs represent the minimum that a remedy must attain; it may sometimes be necessary, where there are multiple contaminants with potentially cumulative and synergistic effects, to go beyond what ARARs require to ensure that a remedy is protective."

The purpose of this RAP is to develop remedial actions for sources of contamination at the Price Pfister property that are protective of human health and the environment, cost-effective, and consistent with planned reuse. Part of this process includes identification and evaluation of ARARs. Potential ARARs are evaluated in this section both for those areas of the Site where available data confirm the presence of COC sources in soil (i.e., Central Building P Area, Building A Area Oil Staging Area, and Building L Area) and any other locations where additional soil contamination might be discovered during redevelopment of the Site. This ARAR evaluation also includes any associated remote staging areas.[1]

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[1] Remote staging areas are separate from the actual contaminated location being remediated. Activities performed at remote staging areas might include contractor vehicle or equipment storage, stockpiling of excavated or fill materials, soil or debris handling operations, or other activities required to support implementation of remedial actions.

5.1 APPLICABLE REQUIREMENTS

The NCP at 40 CFR §300.5 defines applicable requirements as:

> …those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

An applicable requirement directly and fully addresses the situation at a site. In other words, an applicable requirement is one that a party would be subject to if it were undertaking the action independently from any CERCLA authority. For a requirement to be applicable, all jurisdictional prerequisites of the requirement must be met, including; (1) the party must be subject to the law; (2) the substances or activities must fall under the authority of the law; (3) the action must occur in the time period during which the law is in effect; and (4) the action must be one of the types of activities the statute requires, limits, or prohibits (U.S. EPA, 1989a).

State requirements are ARARs only if they are as or more stringent than federal requirements in the following ways (U.S. EPA, 1989b; SWRCB, 1992):

- The state is implementing a program that has a federal counterpart and the state program has received federal approval. An approved state RCRA program would be an ARAR because the state program must be at least as stringent as the RCRA requirements for U.S. EPA to approve the program.

- The state program does not have a federal counterpart because the program has been established due to a state law only.

- State requirements are more stringent than federal requirements. More stringent state maximum contaminant levels ("MCLs") promulgated for drinking water would be ARARs.

State requirements must be identified in a timely manner to be considered as ARARs. The NCP at 40 CFR §300.515(h)(2) indicates that "in a timely manner" means as early as possible but at least before conducting detailed analysis of remedial alternatives.

5.2 RELEVANT AND APPROPRIATE REQUIREMENTS

The NCP at 40 CFR §300.5 defines relevant and appropriate requirements as:

> …those cleanup standards, standards of control, and other substantive requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws, that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

According to U.S. EPA (1989a), determining an ARAR is relevant and appropriate is "site-specific and is based on best professional judgment, taking into account the circumstances of the release or threatened release." U.S. EPA (1989a) states the following:

> Only those requirements that are both relevant and appropriate are ARARs. A requirement may be relevant, but not appropriate, because of site circumstances. Such a requirement would not be an ARAR for the site. Moreover, it is possible for only a portion of a requirement to be considered relevant and appropriate, while other parts may not.

Once a requirement, or part of a requirement, is determined to be relevant and appropriate, its substantive provisions are considered to the same degree as if it were applicable.

5.3 TO-BE-CONSIDERED MATERIALS

The NCP at 40 CFR §300.400(g)(3) describes To-Be-Considered materials ("TBCs") as advisories, criteria, or guidance that may be considered for a particular action or specific issue, as appropriate. TBCs are not ARARs and need not be achieved by remedial actions implemented at a site. U.S. EPA (1989a) states the following regarding TBCs:

TBCs are not potential ARARs because they are neither promulgated nor enforceable. It may be necessary to consult TBCs to interpret ARARs, or to determine preliminary remediation goals when ARARs do not exist for particular contaminants. However, identification and compliance with TBCs is not mandatory in the same way that it is for ARARs.

5.4 TYPES OF ARARs and TBCs

U.S. EPA (1989a) has divided ARARs (and TBCs) into the following three types to facilitate their identification:

- **Chemical-specific ARARs:** These ARARs are usually health- or risk-based numerical values or methodologies used to determine acceptable concentrations of chemicals that may be found in, or discharged to, the environment (e.g., MCLs that establish safe levels in potential drinking water).

- **Location-specific ARARs:** These ARARs restrict actions or contaminant concentrations in certain environmentally sensitive areas. Examples of areas regulated under various federal laws include locations where endangered species or historically significant resources are present.

- **Action-specific ARARs:** These ARARs are usually technology- or activity-based requirements, or limitations on actions or conditions involving specific COCs.

Chemical- and location-specific ARARs are generally identified early in the RI and remedy selection process, while action-specific ARARs are usually identified during the detailed analysis of remedial alternatives (U.S. EPA, 1988b).

5.5 POTENTIAL ARARs AND TBCs

The Clean Water Act ("CWA"), Toxic Substances Control Act ("TSCA"), Clean Air Act ("CAA"), and RCRA are some of the environmental laws with requirements that are frequently applicable or relevant and appropriate. Table 1 summarizes ARARs and TBCs that have been identified to pertain to remedial alternatives for sources of contamination at the Price Pfister property, including legal citations and specific locations at the Site where an ARAR or TBC may be expected to apply. ARARs and TBCs in this table have been grouped by type. Potential ARARs and TBCs relevant to protection of groundwater are included in Table 1 because RAOs and remediation goals calculated for COCs in impacted soil are intended to minimize further degradation to beneficial uses of groundwater at the Site. Numerical criteria associated with chemical-specific and action-specific ARARs and TBCs are summarized in Tables 2 and 3, respectively.

6. REMEDIAL ACTION OBJECTIVES

RAOs describe in general terms what remedial actions should accomplish at a given site in order to be protective of human health and the environment. Consistent with U.S. EPA (1988a) guidance, RAOs for the Price Pfister property were established concurrently with characterization of environmental conditions at the property and first appeared in the RI report. The RAOs are meant to ensure that remedial actions for the Price Pfister property meet the requirements of Section 13304 of the State of California Water Code and Chapter 6.8 of the State of California HSC.

Section 13304 of the State of California Water Code governs RWQCB's oversight of investigation and remediation of chemical releases to soil and groundwater to preserve the water quality of the State. Chapter 6.8 of the HSC describes requirements for preparing a RAP under RWQCB or DTSC supervision, including the recommendation of remedial actions that are based upon evaluation of selection criteria contained in the NCP. In particular, the NCP, at 40 CFR §300.430(a)(1)(i), explains that the remedy selection process should lead to the implementation of remedial actions that protect human health and the environment, maintain protection over time, and minimize untreated waste.

RAOs for the Price Pfister property consist of the following:

- Remove, or treat in-situ COC sources in soil that have the potential to migrate in the subsurface or pose potential significant human health hazards.

- Implement remedial actions at each COC source in soil such that COCs will not migrate from soil and cause COC concentrations in groundwater that exceed MCLs or, if none, U.S. EPA Region IX tap water preliminary remediation goals ("PRGs") or other appropriate water quality criteria.[2]

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[2] This RAO is intended to prevent VOCs in source soil at the Price Pfister property from migrating to groundwater at concentrations that would potentially cause further degradation to the beneficial uses of groundwater designated in the Basin Plan (RWQCB, 1994). The RAO is not meant to imply that Price Pfister will implement remedial actions that are designed to restore groundwater beneath the Site to its beneficial uses. Groundwater restoration by Price Pfister is not practicable due to ongoing migration of VOCs in groundwater from the Holchem/Brenntag facility and possibly other nearby facilities.

- Implement remedial actions at each COC source in soil so as not to exceed a cumulative hazard index ("HI") of 1 for non-carcinogenic COCs remaining in soil at the Site.

- Implement remedial actions at each COC source in soil so as not to exceed a cumulative incremental lifetime cancer risk of 10^{-5} for potential carcinogenic COCs remaining in soil at the Site.

- Implement remedial actions at each COC source in soil so as not to exceed a blood lead concentration greater than 10 micrograms per deciliter ("µg/dl") at the 99th percentile in potentially exposed individuals resulting from the total exposure to lead at the Site and that which is natural occurring in the environment (e.g., air, food, water) as calculated by the DTSC Lead Spread Version 7.0 computer model ("Lead Spread").

RAOs should consider potentially complete exposure pathways as well as numerical remediation goals because protectiveness may be achieved by either preventing exposure (such as capping an area or limiting access) or by reducing contaminant concentrations to numerical remediation goals that are associated with the reasonably anticipated land use of the site in question (U.S. EPA, 1995, 1988a). Section 7 presents remediation goals for the Price Pfister property.

7. REMEDIATION GOALS

Remediation goals for the Price Pfister property assist in determining when remedial actions have met the RAOs described in Section 6. Remediation goals can be established in two ways. The first way is to adopt chemical-specific ARARs or TBCs. The second way is to calculate acceptable site-specific risk-based COC concentrations. Review of environmental laws and regulations presented in Section 5 indicates that chemical-specific ARARs or TBCs do not exist for the majority of COCs at the Price Pfister property that adequately consider environmental conditions or the scenarios under which individuals may be exposed to COCs at the Site. Consequently, risk-based COC concentrations that serve as remediation goals had to be calculated for the Price Pfister property due to the lack of relevant chemical-specific ARARs and TBCs.

The remediation goals summarized in Table 4 and discussed in Sections 7.1 and 7.2 are refinements of the leaching values and risk-based screening levels ("RBSLs") in the RI report that were derived to prevent further degradation of groundwater quality and to protect human health, respectively.

7.1 REMEDIATION GOALS TO PREVENT FURTHER DEGRADATION OF GROUNDWATER QUALITY

As discussed in Section 5, the California Water Code requires that each of the nine Regional Boards in the State adopt Basin Plans. The Basin Plan (RWQCB, 1994) for the Los Angeles area indicates that beneficial uses of groundwater in the San Fernando Valley Groundwater Basins, where the Price Pfister property is located, include municipal, domestic, agricultural, and industrial supply.

Because of the beneficial uses designated in the Basin Plan, MCLs are potential ARARs and U.S. EPA Region IX PRGs derived for tap water are potential TBC criteria for groundwater in the vicinity of the Price Pfister property. The ongoing chemical migration in groundwater from releases that have occurred at the Holchem/Brenntag facility and other causes of regional groundwater contamination makes it impracticable for Price Pfister to implement remedial actions that are designed to reduce COCs in groundwater beneath the Site to concentrations less than MCLs or PRGs. Remedial actions for the Price Pfister property are not meant to address COCs emanating from the Holchem/Brenntag facility or other nearby facilities. Remedial actions for the Site will be designed to mitigate potential impacts on groundwater quality associated with COC sources at the Price Pfister property (i.e., PCE migration to groundwater at the Central Building P Area and Oil Staging Area, and FHP on groundwater at the Building A Area). To assist with evaluating the performance of remedial actions in meeting this RAO, groundwater protection remediation goals for VOCs and hexavalent chromium have been calculated.

Groundwater protection remediation goals are required only for VOCs and hexavalent chromium because other metals, SVOCs, and petroleum hydrocarbons as oils remaining in the subsurface at the Price Pfister property are not prone to leaching and/or migrating as vapor to groundwater, as discussed in the RI report. Unlike VOCs, the hexavalent chromium concentrations that have been measured in soil and groundwater at the Price Pfister property do not warrant remedial actions. A groundwater protection remediation goal for hexavalent chromium has been calculated solely to allow identification of hexavalent chromium-containing soil that may pose a potential threat to groundwater quality in the event such soil exists at the Price Pfister property and is uncovered in the future.

Groundwater protection remediation goals were calculated using VLEACH and Summer's mixing box model following the methodology described by RWQCB (1996). VLEACH was used: (1) to simulate the leaching and vapor migration of VOCs, and the leaching of hexavalent chromium in the unsaturated zone and (2) to predict the fluxes of VOCs and hexavalent chromium from the unsaturated zone into groundwater over time. VLEACH modeling of VOCs was conducted assuming VOC vapors can sink to the top of the saturated zone by density driven flow as well as migrate to ground surface by vapor intrusion through building foundation cracks or gaps caused by penetrations through building foundations. The predicted fluxes of VOCs and hexavalent chromium into groundwater were entered into Summer's model to derive the resultant hypothetical groundwater concentrations.

Groundwater protection remediation goals are the VOC and hexavalent chromium concentrations in soil that are calculated by the VLEACH and Summer's models not to result in VOC and hexavalent chromium concentrations in groundwater greater than relevant MCLs or PRGs. The groundwater protection remediation goal for hexavalent chromium is based upon the MCL of 50 $\mu g/L$ for total chromium because no MCL has been established for hexavalent chromium.

Chemical parameters used in the VLEACH and Summer's models for calculation of groundwater protection remediation goals were compiled from two references. Henry Law constants were obtained from Gossett (1987) or Montgomery (2000). Organic carbon partition coefficients, aqueous solubilities, diffusion coefficients, and other physical parameters were obtained from Montgomery (2000). Physical parameters, such as soil properties, depth to groundwater, climatic features, and groundwater flow characteristics, are summarized in Appendix B. Whenever possible, physical parameters were based upon Site-specific information or default values obtained from U.S. EPA (2000a, 1989c) or DTSC (1999). The surface area of the modeled VOC source in soil was assumed to be 4,000 ft^2, which is equivalent to the size of the generalized area at Central Building P Area where VOC concentrations in soil may be greater than human health remediation goals for direct contact (Figure 6). The surface area of the modeled hexavalent chromium source in soil was arbitrarily assumed to be 400 ft^2 because hexavalent chromium is detected only sporadically in soil and no significant source area has been identified.

Table 4 summarizes groundwater protection remediation goals for three depth intervals beneath the Price Pfister property. Groundwater protection remediation goals were derived for three depth intervals because the depth to groundwater at the Site ranges from approximately 50 to 70 ft bgs and the extent to which VOCs and hexavalent chromium will attenuate before reaching groundwater depends upon the height above the top of the saturated zone that VOCs and hexavalent chromium in soil are located. Greater attenuation will occur as the distance between the VOCs and hexavalent chromium in soil and the groundwater increases.

The first depth interval for which a groundwater protection remediation goal has been derived extends from ground surface to a depth of 3 ft bgs. This depth interval is assumed to correspond to the shallow soil layer at the Site. The remaining two depth intervals essentially divide the subsurface soil between 3 ft bgs and the top of the saturated zone in half in order to calculate groundwater protection remediation goals that take into account the differing extent of attenuation that occurs depending upon where VOCs and hexavalent chromium in soil are located above the top of the saturated zone. Groundwater protection remediation goals have been derived for the depth intervals from 3 to 30 ft bgs and 30 to 60 ft bgs.

7.2 REMEDIATION GOALS FOR PROTECTION OF HUMAN HEALTH

According to U.S. EPA (1991a), remediation goals are derived specifically for a given property and take into account the COCs that have been identified, media that have been impacted, most likely future land use, and pathways and conditions under which exposure may occur at a particular property. In addition, remediation goals are calculated by establishing acceptable or target risk levels that will protect potentially exposed populations from the non-carcinogenic and carcinogenic effects of COCs.

Current and future users of the Price Pfister property may include industrial/commercial workers, earthwork construction workers, and maintenance personnel. Figure 19 identifies the complete or potentially complete exposure pathways for these on-Site populations. As depicted on Figure 19, inhalation of VOCs by vapor intrusion is the only potentially complete exposure pathway for industrial/commercial workers given the requirement in the RMP that the Price Pfister property remain covered. Direct contact with contaminated soil through ingestion, dermal contact, and inhalation are the potentially complete exposure pathways for earthwork construction workers and maintenance personnel.

With the exception of lead, remediation goals for protection of human health were calculated based upon target risk levels of an HI of 1 for non-carcinogens and an incremental lifetime cancer risk of 10^{-6} for carcinogens. The lead remediation goal is based upon a target risk level that corresponds to a blood lead concentration of 10 μg/dl at the 99th percentile (i.e., a one percent chance that blood lead concentrations will be greater than 10 μg/dl) for potentially exposed populations.

Human health remediation goals were calculated for COCs using U.S. EPA (2000a) and DTSC (2000) computer models, or hazard and risk equations based on those presented in U.S. EPA (2002a, 1996c, 1991a, 1989c) and DTSC (1999, 1996) guidance documents. The RI report describes in greater detail the methodology followed to calculate remediation goals. Physical parameters, human health exposure parameters, and toxicity values used as inputs are presented in Appendix B. Table 4 summarizes human health remediation goals for COCs identified at the Price Pfister property based upon the methodology for calculating these goals described in the RI report, and the input values presented in Appendix B.

Except for petroleum hydrocarbons and lead, the human health remediation goals in Table 4 are the lowest non-carcinogenic human health remediation goal ("RG_{nc}") and carcinogenic human health remediation goal ("RG_c") for each COC that protects all defined potentially exposed populations consistent with complete or potentially complete pathways shown on Figure 19.

7.3 USE OF REMEDIATION GOALS TO DETERMINE ACHIEVEMENT OF RAOs

Remediation goals are intended to assist with determining when remedial actions have met the RAOs described in Section 6. Use of remediation goals is not compulsory and it may not be possible or necessary to attain them. For example, human health remediation goals for non-VOCs (i.e., petroleum hydrocarbons as oils, metals and cyanide, and SVOCs) are relevant only to remedial actions that rely upon the removal or treatment of non-VOCs in soil to protect human health and the environment. Human health remediation goals for non-VOCs are not applicable to remedies that offer protection by preventing exposure such as capping an area or limiting access. Although it is not mandatory for remedial actions to attain remediation goals, remedial actions must achieve the RAOs in Section 6 to be considered protective of human health and the environment.

Upon implementing remedial actions that involve removal or treatment of contaminated soil, COC concentrations will be compared to the relevant human health remediation goals in Table 4 that correspond to the depth intervals where COCs remain in the subsurface. Removal or treatment of contaminated soil at the Price Pfister property may not achieve individual human health remediation goals. It may be inevitable that residual COC concentrations at some of these areas will be greater than individual human health remediation goals. Under such circumstances, removal or treatment of the COCs will be judged complete when the human health remediation goal for lead is achieved and residual concentrations of other COCs in soil no longer pose hypothetical risks to potentially exposed individuals that are greater than a cumulative HI of 1 and a cumulative incremental lifetime cancer risk of 10^{-5}. In lieu of using the human health remediation goals in Table 4, cumulative HIs and cancer risks of residual COCs may be calculated after removing or treating contaminated soil to ensure that residual COCs in soil and soil gas are not present at concentrations that exceed target risk levels for each potentially exposed population. Formulas for calculating cumulative HIs and carcinogenic risks at a location in question are presented in Appendix B.

Besides meeting non-carcinogen and carcinogen target risk levels for vapor intrusion and direct contact exposure pathways, remedial actions for VOCs and hexavalent chromium must be designed to achieve groundwater protection remediation goals. Table 4 also includes the remediation goals for VOCs and hexavalent chromium that are calculated to be protective of groundwater. However, attainment of these remediation goals may not be feasible given regional groundwater contamination. VOCs are migrating in groundwater onto the Price Pfister property due to chemical releases at Holchem/Brenntag and potentially other nearby facilities. VOCs from the

Holchem/Brenntag facility may volatilize from groundwater and continue to contaminate soil at the Site making it impossible for remedial actions implemented by Price Pfister to attain remediation goals.

Remediation goals in Table 4 for VOCs are expressed in soil and soil gas concentrations. Remedial actions can be determined to be complete based upon the analytical results of either soil or soil gas samples. Certain remediation goals might be below the range of typical analytical method reporting limits for VOCs and hexavalent chromium. In such cases, the remediation goals are the desirable cleanup levels, but attainment can only be determined at the standard analytical method reporting limits. Actual analytical method reporting limits determining attainment with remediation goals will be established at the time of confirmation sampling and will consider such factors as whether matrix interferences exist in the samples that necessitate raising the standard analytical method reporting limits.

8. IDENTIFICATION AND SCREENING OF TECHNOLOGIES

Identifying and screening potentially suitable technologies is the initial step in assembling appropriate remedies that achieve the RAOs established in Section 6, comply with ARARs, and satisfy other evaluation criteria established by the State of California. Technologies that pass the screening process are developed into remedial alternatives. The remedial alternatives are themselves screened and the alternatives that are retained undergo detailed analysis. The results of the detailed analysis determine the remedial alternatives that are recommended for implementation. Section 8 describes the identification and screening of technologies. Section 9 summarizes the screening of remedial alternatives. Section 10 presents the detailed analysis of alternatives.

8.1 PRINCIPAL THREAT AND LOW-LEVEL THREAT WASTES

To facilitate the identification and screening of technologies, U.S. EPA (1991b) has developed guidelines to communicate the types of remedies it generally anticipates to find appropriate for different source materials. U.S. EPA (1997c) defines source material as:

> ...material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to groundwater, to surface water, to air, or acts as a source for direct exposure.

Source material is divided into principal threat waste and low-level threat waste. The definitions of these wastes are as follows:

- **Principal Threat Waste:** Source material that is considered to be highly toxic or extremely mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. Principal threat waste includes non-aqueous phase liquid, extremely mobile liquids (e.g., solvents), or materials having high concentrations of toxic compounds. Although no "threshold level" of toxicity has been established for definition of a principal threat waste, U.S. EPA (1991b) indicates for conditions where toxicity and mobility of source material combine to pose a potential risk of 10^{-3} or greater, treatment alternatives generally should be evaluated.

- **Low-level Threat Waste:** Source material that can be reliably contained and that would pose only a low risk in the event of exposure. Low-level threat waste is source material that exhibits low toxicity, limited mobility in the environment, or has COC concentrations near health-based levels.

PCE that may remain as a distinct organic liquid in soil at the Central Building P Area and Oil Staging Area might be considered a principal threat waste because of the possible risks to human health and groundwater quality caused by the mobility of PCE at the Site. Volatilization of PCE from residual liquid in the unsaturated zone is a potentially significant transport mechanism. Metals, petroleum hydrocarbons characteristic of oils, and SVOCs are the other COCs that have been released at the Price Pfister property. These COCs do not display appreciable mobility in the environment and the types or concentrations of metals, petroleum hydrocarbons, and SVOCs present at the Site do not pose appreciable human health risks.

8.2 IDENTIFICATION AND SCREENING OF GENERAL RESPONSE ACTIONS, TECHNOLOGIES, AND PROCESS OPTIONS

The NCP at 40 CFR §300.430(a)(1)(iii)(A) states that "U.S. EPA expects to use treatment to address the principal threats posed by a site, wherever practicable. Principal threats for which treatment is most likely to be appropriate include liquids, areas contaminated with high concentrations of toxic compounds and highly mobile materials." On the basis of this expectation, treatment appears to be an appropriate remedy for PCE to the extent it was present as residual organic liquid in soil at the Central Building P Area and Oil Staging Area.

Soil at the Site that contains metals, petroleum hydrocarbons as oils, and/or SVOCs can be considered low-level threat wastes. The NCP at 40 CFR §300.430(a)(1)(iii)(B) states that "U.S. EPA expects to use engineering controls, such as containment, for waste that poses a relatively low long-term threat or where treatment is impracticable." The long-term effectiveness of such remedies must be enforced through institutional controls that ensure, among other things, that assumptions regarding the integrity of cover and exposure duration stay relevant.

U.S. EPA (1988a) considers general response actions to be those actions that will satisfy RAOs established for a site. General response actions are divided into remedial technologies, which themselves are divided into process options. Remedial technologies refer to general categories of technologies, such as capping, subsurface barriers, or extraction. Process options refer to specific processes within each category of remedial technology. For example, extraction remedial technology would include the process options of using wells or trenches to remove groundwater from the subsurface. Several broad types of remedial technologies may be identified for each general response action, and numerous process options may exist for each category of remedial technology.

In accordance with U.S. EPA's *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, general response actions, technologies, and process options for the Price Pfister property were evaluated against the short- and long-term aspects of the following three criteria as described under the NCP at 40 CFR §300.430(e)(7):

- **Effectiveness:** General response actions, technologies, and process options were judged on the degree to which an alternative reduces toxicity, mobility, or volume through treatment, minimizes residual risks and affords long-term protection, complies with ARARs, minimizes short-term impacts, and how quickly it achieves protection. General response actions, technologies, and process options providing significantly less effectiveness than other, more promising technologies were eliminated. Also eliminated from further consideration were general response actions, technologies, and process options that do not provide adequate protection of human health and the environment.

- **Implementability:** This criterion focuses on the technical and administrative feasibility of implementing general response actions, technologies, and process options. General response actions, technologies, and process options that are technically or administratively infeasible, or require equipment, specialists, or facilities that are not available within a reasonable period of time were eliminated from further consideration.

- **Cost:** Costs of construction and any long-term costs to operate and maintain the general response actions, technologies, and process options were considered. Costs that were grossly excessive compared to the overall effectiveness of the general response actions, technologies, and process options were used as a factor to exclude technologies from further consideration. General response actions, technologies, and process options providing effectiveness and implementability comparable to that of other general response actions, technologies, and process options by employing a similar method of treatment or engineering control, but at greater cost, were also eliminated.

Tables 5 and 6 summarize the evaluation of general response actions, remedial technologies, and process options for impacted soil and groundwater, respectively, at AOCs on the Price Pfister property. Appendix C provides a discussion of this evaluation. Retained general response actions, remedial technologies, and process options have been assembled into potential remedial alternatives in Section 9.

9. POTENTIAL REMEDIAL ALTERNATIVES

Descriptions of potential remedial alternatives and their applicability to AOCs (i.e., Central Building P Area, Building A Area, Oil Staging Area, and Building L Area) at the Site are presented below. The potential alternatives include the no action alternative for both soil and groundwater; soil removal or in-situ treatment actions only; and soil removal or in-situ actions paired with groundwater response actions.

9.1 DESCRIPTIONS OF POTENTIAL REMEDIAL ALTERNATIVES

Potential remedial alternatives and their applicability to the Central Building P Area, Building A Area, Oil Staging Area, and Building L Area are discussed in Sections 9.1.1 through 9.1.9. It should be noted that institutional controls are included as a component of all remedial alternatives listed considered except for the no action alternative described in Section 9.1.1. Institutional controls will restrict the Site to commercial and industrial uses, prevent the use of groundwater, and obligate future owners and tenants of the Site to implement the procedures specified in the RMP and to update information in the RMP as appropriate. The institutional controls also require the maintenance of existing cover or construction of new cover at the Site if the existing cover is removed.

9.1.1 No Action for Soil and Groundwater

The NCP at 40 CFR §300.430(e)(6) requires that the no action alternative be evaluated as a baseline for comparison of other alternatives developed. This alternative is retained for detailed analysis at the Central Building P Area, Building A Area, Oil Staging Area, and Building L Area.

9.1.2 Excavate Soil and Dispose Off-Site, and No Action for Groundwater

Excavation and disposal of COC-containing soil at an off-site, permitted facility without any groundwater response actions is applicable only to the Building L Area where metals, petroleum hydrocarbons, and SVOCs present at this location bind tightly to soil, remain in the upper two feet of soil, and are not prone to leach to groundwater. Unlike the Central Building P Area, Building A Area, and Oil Staging Area, groundwater has not been impacted by chemical releases that took place at the Building L Area. Excavation and disposal of COC-containing soil at an off-site, permitted facility without any groundwater response actions is retained for detailed analysis only for the Building L Area.

9.1.3 Perform SVE in Soil and Monitor Natural Attenuation of Groundwater

As discussed in Section 4, the SVE systems have substantially removed PCE in soil and PCE vapor that migrated to the saturated zone at the Central Building P Area and Oil Staging Area. PCE still left in soil at these areas would be removed by continuing to operate the SVE systems until RAOs are met. Natural attenuation would be relied upon to reduce PCE concentrations in dissolved groundwater from PCE vapor that accumulated on top of the saturated zone before the SVE systems began operating.

9.1.4 Perform SVE in Soil and Conduct IAS in Groundwater

This alternative is retained for detailed analysis for the Central Building P Area and Oil Staging Area. Instead of relying solely on MNA to reduce PCE concentrations in groundwater, in-situ air sparging ("IAS") would be added to the SVE systems to enhance the removal of residual PCE dissolved in groundwater.

9.1.5 Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

This alternative may be appropriate for the Central Building P Area and Oil Staging Area where impacted soil acts as a source of VOCs to soil gas and localized dissolved VOC contamination in groundwater exists as a result of historical chemical releases to soil. Groundwater would be treated for discharge to the storm drain under a NPDES permit.

9.1.6 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

This alternative combines focused excavation with operation of SVE systems. Excavation would be designed to remove soil containing non-volatile petroleum hydrocarbons as oils and metals near the clarifier within the plating line and WWTS at the Central Building P Area and soil containing non-volatile petroleum hydrocarbons beneath the containment sump at the Oil Staging Area. SVE would address PCE remaining in soil, and air sparging would remove dissolved PCE in groundwater. This alternative is retained for detailed analysis for the Central Building P Area and Oil Staging Area.

9.1.7 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater

This alternative is similar to the one described under Section 9.1.6 except extraction instead of IAS would be implemented to remove dissolved PCE in groundwater. Extracted groundwater would be treated for discharge to the storm drain under a NPDES permit. This alternative is retained for detailed analysis for the Central Building P Area and Oil Staging Area.

9.1.8 Perform Complete Excavation of Soil and Dispose Off-Site, and Collect FHP from Groundwater

This alternative applies to the Building A Area and involves excavating petroleum hydrocarbon-containing soil to the top of the saturated zone. FHP would continue to be removed by the existing collection system described in Section 4.3.2.

9.1.9 Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP from Groundwater

This alternative would limit excavation of petroleum hydrocarbon-containing soil to the upper 3 feet at the Building A Area. The rationale for limiting excavation to this depth is that material above 3 feet bgs represents soil most likely to be contacted by maintenance workers or other individuals (e.g., gardeners, plumbers, electricians) who may not be properly trained to manage contaminated soil. FHP would continue to be removed by the existing collection system.

9.2 SUMMARY OF POTENTIAL REMEDIAL ALTERNATIVES BY AOC

Listed below are potential remedial alternatives for each AOC that undergo detailed analysis in Section 10.

Potential Remedial Alternatives by AOC

Potential Remedial Alternative	AOC			
	Central Building P Area	Building A Area	Oil Staging Area	Building L Area
No Action for Soil and Groundwater	✓	✓	✓	✓
Excavate and Dispose of Soil Off-Site, and No Action For Groundwater				✓
Perform SVE in Soil and Monitor Natural Attenuation of Groundwater	✓		✓	
Perform SVE in Soil and Conduct IAS in Groundwater	✓		✓	
Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater	✓		✓	
Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater	✓		✓	
Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater	✓		✓	
Perform Complete Excavation of Soil and Dispose Off-Site, and Collect FHP from Groundwater		✓		
Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP from Groundwater		✓		

Table D-1 in Appendix D provides a summary of key parameters associated with implementing potentially applicable remedial alternative at each AOC. Key parameters were derived from available Site-specific information and used to estimate costs of implementing potentially applicable remedial alternative at each AOC. Estimated costs are one component of the detailed analysis presented in Section 10.

10. DETAILED ANALYSIS OF POTENTIAL REMEDIAL ALTERNATIVES

Section 9 describes the potential remedial alternatives that have been retained for consideration in this RAP. Consistent with the NCP at 40 CFR §300.430(e)(9), a detailed analysis of these alternatives has been conducted in this section to identify the remedial actions that are recommended for implementation at each area that is believed to serve as a source of COCs at the Site. The detailed analysis consists of an assessment of individual alternatives against each of nine evaluation criteria and a comparative analysis that focuses upon the relative performance of each alternative against those criteria. All remedial actions recommended for implementation at each AOC of the Site must meet the following two "Threshold Criteria:"

Threshold Criteria:

- Provide short- and long-term protection of human health and the environment from unacceptable risks posed by the hazardous substances released into the environment.
- Comply with ARARs, unless the circumstances for a waiver apply. Site-specific ARARs are identified in Table 1.

Besides Threshold Criteria, five "Balancing Criteria" and two "Modifying Criteria" must be considered when selecting remedial alternatives to be implemented. Balancing and Modifying Criteria consist of the following:

Balancing Criteria:

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume through treatment
- Short-term effectiveness
- Implementability
- Cost

Modifying Criteria:

- State acceptance
- Community acceptance

Balancing Criteria are used to recommend the remedial actions from those that meet the Threshold Criteria. Modifying Criteria further shape the recommended remedial actions by taking into account the concerns of state agencies and the public.

Additionally, Section 25356.1 of Chapter 6.8 of the State of California HSC requires that the following six factors be considered when preparing a RAP:

- Overall protection of human health and the environment
- Compliance with federal and state requirements
- Reduction of toxicity, mobility, and volume through treatment
- Long-term effectiveness and permanence
- Cost effectiveness
- Short-term effectiveness

Remedial alternatives for the Site have also been evaluated against these six factors and general compliance with the State of California HSC.

Tables 7 through 15 summarize the analysis of remedial alternatives against each of the nine evaluation criteria specified in the NCP and the six factors specified under the State of California HSC. Remedial alternatives that achieve the NCP threshold criteria are subsequently compared against one another to determine which alternatives best meet the remaining NCP evaluation criteria and State of California HSC factors. The results of the comparative analysis of remedial alternatives for each AOC are summarized in Tables 16 through 19. These tables also indicate the recommended remedial actions specific to the AOCs. Remedial alternatives were evaluated against NCP evaluation criteria and State of California HSC factors assuming that redevelopment of the Site will occur after six months of RWQCB approval of the RAP.

10.1 REMEDIAL ALTERNATIVE COST ESTIMATION

Costs presented in Tables 16 through 19 were prepared by a detailed cost estimating approach that follows guidance jointly prepared by U.S. EPA and the U.S. Army Corps of Engineers (2000c). Detailed estimating is often referred to as "bottom up" estimating because costs are built on an item-by-item basis. Bottom up estimating relies upon quantity take-offs and assembled unit cost information. Detailed estimating is believed to be an accurate methodology of estimating remediation costs. Spreadsheets with line item costs supporting the summary costs presented in Tables 16 through 19 have been prepared. The spreadsheets containing supporting cost information are included as Appendix D. Pertinent design assumptions, key cost factors, and assumptions are discussed in this section.

10.1.1 Design Criteria Assumptions

Detailed cost estimating requires that the environmental conditions at a site be defined, or reasonably assumed, so that a remedy can be conceptually designed and costs of the key items that comprise the remedy can be generated. Table D-1 included in Appendix D summarizes the key design assumptions (e.g., volumes of impacted soil) that govern the estimated costs of remedial alternatives presented in this RAP. Although many of the assumptions are subject to uncertainty, available data on the nature and extent of chemical releases that have been identified at the Site provide reasonable assurance that the chosen remedial alternatives can be implemented within the cost ranges estimated herein and will be protective of human health and the environment. U.S. EPA and U.S. Army Corps of Engineers cost estimation guidance (2000c) states the following regarding the quality of cost estimates prepared in a RAP or feasibility study ("FS"):

> During the FS, cost estimates are developed for each remedial action alternative for comparison purposes. The accuracy of these estimates is linked to the quality of the RI data, which helps define the scope of each alternative. Because the RI/FS cannot remove all uncertainty no matter how good the data may be, the expected accuracy of cost estimates during the FS is less than that of estimates developed during the later stages of the Superfund process.

This same guidance expects cost estimates prepared as part of the "detailed analysis of alternatives phase of the FS" to have an accuracy of –30 to +50 percent. Cost estimates presented in this RAP were generated with this accuracy range as a goal. Accordingly, the selected remedial alternatives and their associated estimated present worth of total costs are intended to be conservative to account for the uncertainty regarding environment conditions at the Site.

10.1.2 Direct and Indirect Costs of Remedial Alternatives

Costs associated with implementing remedial actions at specific AOCs of the Site have been allocated to those areas by the AOC-specific alternatives and are referred to herein as direct costs. Direct costs include estimated contractor overhead and profit, design and management construction services, and contingencies. In addition to these expenditures, estimated costs have been included for coordination of implementation of remedial actions with regulatory agencies including RWQCB, conducting annual reporting, performing 5-year reviews, and supervising compliance with the RMP. These latter costs are referred to herein as indirect costs. The identified indirect costs are not assigned to individual areas of the Site and are shown separately in the spreadsheets in Appendix D. Indirect costs do not include premiums for insurance policies for environmental coverage or reimbursement for RWQCB oversight of environmental restoration of the Site. Such costs, if any, would be in addition to those stated in the spreadsheets.

10.1.3 Sources of Cost Information

Unit costs included in the detailed estimates were assembled from a combination of quotations from local contractors, laboratories, vendors, and disposal facilities; EKI project experience from similar, recent Southern California redevelopment projects; and published cost estimating guides, including R.S. Means.

10.2 RECOMMENDED REMEDIAL ACTIONS SPECIFIC TO AOCs

Recommended remedial actions specific to the AOCs at the Price Pfister property are summarized below. Greater discussion of these remedial actions and the plan for implementing them are provided in Section 11.

10.2.1 Central Building P Area

SVE and IAS will be performed to address PCE impacts to soil and groundwater caused by the release of PCE at this area. The clarifier within the plating line and WWTS will be removed and soil adjacent and beneath the clarifier that contains petroleum hydrocarbons and other COCs will be excavated and appropriately disposed at an off-Site, permitted waste management facility.

10.2.2 Building A Area

Recommended remedial actions for the Building A Area consist of excavating petroleum hydrocarbon-containing soil within the upper 3 feet of the AOC and appropriately disposing of the soil at an off-Site, permitted waste management facility. Collection of FHP from groundwater also will continue.

10.2.3 Oil Staging Area

Recommended remedial actions for the Oil Staging Area consist of SVE and IAS to remediate impacts to soil and groundwater caused by the release of PCE at this area. The containment sump will be removed and soil adjacent and beneath the containment sump that contains petroleum hydrocarbons and other COCs will be excavated and appropriately disposed at an off-Site, permitted waste management facility.

10.2.4 Building L Area

Black sand and soil with metals or other COCs, including PCE, petroleum hydrocarbons, chrysene, phenanthrene, and pyrene, beneath the pavement at the Building L Area will be excavated and appropriately disposed at an off-Site, permitted waste management facility.

11. REMEDIAL ACTION PLAN

This section describes the plan for implementing recommended remedial actions at the Price Pfister property. Price Pfister will be conducting additional groundwater investigation at and near the Site. If, as a result of those additional investigations, it is determined that additional remedial actions might be warranted, the need for such remedial actions will be evaluated.

11.1 IMPLEMENTATION OF RECOMMENDED REMEDIAL ACTIONS

The recommended remedial actions are intended to be flexible to accommodate various approaches for redeveloping the Price Pfister property while still safeguarding human health and the environment. Redevelopment may entail occupying all or some of the existing buildings for industrial or commercial purposes. Alternatively, some or all of the Site improvements may be demolished for construction of new industrial or commercial building space. The manner in which certain remedial actions are implemented and the timeframe for doing so are contingent upon when Price Pfister sells the property and the new owner's redevelopment plan for the Site.

11.1.1 Current Remedial Actions

Non-VOCs (i.e., petroleum hydrocarbons as oils, metals and cyanide, and SVOCs) in soil currently do not pose significant human health or environmental threats because the non-VOCs that exist at the Site do not display appreciable mobility and the Site is covered with buildings and pavement that prevent direct contact with impacted soil . Current remedial actions for the Price Pfister property are therefore focused on enhancing the control and removal of VOCs by continuing to operate the SVE systems at the Central Building P Area and Oil Staging Area and adding IAS to these systems.

PCE concentrations in soil gas have been substantially reduced by the SVE systems operating at the Central Building P Area and Oil Staging Area. The SVE systems will continue to operate until the RAOs are met, asymptotic VOC concentrations in soil gas are attained, or operation of the SVE systems must be halted to allow redevelopment of the Site to proceed. If SVE must be performed after redevelopment activities are completed at the Central Building P Area and Oil Staging Area to address PCE remaining in soil at these AOCs, a plan will be prepared that specifies how the SVE systems will be incorporated into the redevelopment and outlines the schedule for resuming operation of the SVE systems.

IAS will be added to the SVE systems to address PCE that dissolved into groundwater by PCE vapor that accumulated on top of the saturated zone before operation of the SVE systems began. As described in the *Work Plan for In-Situ Air Sparging* (EKI, 2003a) submitted to RWQCB on 3 April 2003, it is anticipated that IAS will be added to the SVE systems by the end of May 2003. IAS will be operated concurrently with the SVE systems until PCE in groundwater is reduced to concentrations similar to those emanating from the Holchem/Brenntag facility as measured in groundwater samples collected from monitoring well A2 (Figure 2) or until redevelopment of the property requires operation of IAS to be halted.

Collection of FHP from wells MW-1, MW-2, and MW-3 at the Building A Area will continue. Importantly, this oil FHP on groundwater is not mobile and poses no human health threat as long as use of groundwater beneath the Site is prohibited (Section 11.2.7). FHP collection will be initiated from wells PMW-16, PMW-17, and PMW-18 by May 2003. The FHP collection system eventually will be expanded from these six wells to a total of 10 to 15 wells. It is anticipated that FHP will be collected from the wells until it is no longer practicable to do so. Since FHP collection is a slow process and likely to be protracted, additional collection wells will be installed after redevelopment of the Building A Area if redevelopment is to occur within 3 years of the date of this RAP. Installing the wells after redevelopment reduces the possibility that the wells will have to be abandoned before meaningful quantities of FHP are recovered from the wells. FHP collection from the existing six wells also may need to be suspended to allow redevelopment to proceed in the Building A Area. FHP collection will resume as redevelopment activities allow.

11.1.2 Additional Remedial Actions Contingent Upon Redevelopment

The recommended remedial actions call for excavation of non-VOC sources within the upper 3 feet of soil from the AOCs (i.e., Central Building P Area, Building A Area, Oil Staging Area, and Building L Area). The rationale for limiting excavation to this depth is that material above 3 feet bgs represents soil most likely to be contacted by maintenance workers or other individuals (e.g., gardeners, plumbers, electricians) that are not likely to be health and safety trained. Excavation of non-VOC sources at the AOC requires that existing improvements be removed because the sources are covered by buildings and pavement. Excavation of non-VOC sources will be conducted as the existing improvements, which restrict access to the impacted soil, are demolished during redevelopment of the Site. In the interim, protocols specified in the RMP require that the cover at the Site remains intact and that individuals that may dig below the cover at the AOCs are informed of the nature and extent of non-VOCs in soil and are appropriately health and safety trained.

In addition, the need to terminate SVE and IAS, and the timing for installing additional FHP collection wells at the Building A Area depend upon when Site redevelopment takes place. The SVE and IAS systems may not have to be reinstalled at the Central Building P Area and Oil Staging Area if remediation can be achieved before redevelopment occurs.

11.1.3 RMP Protocols

The RMP is a component of the recommended remedial actions and includes protocols for conducting inspections, performing sampling if suspected soil contamination is encountered, and maintaining institutional controls. RMP protocols when used in conjunction with the other recommended remedial actions will protect potentially exposed populations before, during, and after redevelopment of the Price Pfister property.

The RMP requires that existing cover over the entire Site be maintained, except during periods of demolition and construction, until it is replaced with new buildings or other improvements constructed as part of redevelopment of the Site and that this new cover be maintained. This cover will prevent exposure to non-VOC sources in soil at the AOCs and undiscovered contamination that might exist at other Site locations.

Available data and information compiled in the RI are adequate for purposes of assembling remedial actions to mitigate the primary COC releases at the Price Pfister property. However, like most former industrial land undergoing redevelopment, it is impracticable to sample every location where minor soil contamination may exist at the Site. Maintaining cover over the Price Pfister property reduces the possibility that individuals will inadvertently contact undiscovered soil contamination, if any, at the Site. To identify and properly respond to any undiscovered contamination, the RMP includes methods for inspecting soil for evidence of contamination when performing future subsurface activities and describes protocols for managing impacted soil or subsurface structures (e.g., sanitary sewer lines, sumps, catch basins) that may have historically contained or leaked hazardous materials if they are encountered during Site reuse. The RMP outlines sampling procedures to document the nature and level of any contamination found.

Besides requiring that the Price Pfister property be kept covered and establishing protocols to be followed when conducting subsurface activities, the RMP states that SSD, SVE, or equally effective measures may need to be instituted to protect building tenants at the Site from the vapor intrusion exposure pathway. Vapor intrusion may remain a concern after completing SVE and IAS at the Central Building P Area and Oil Staging Area due to the potential for VOCs to volatilize from groundwater and travel through soil gas into air inside buildings. Measures to control vapor intrusion may have to be maintained until VOC-containing groundwater stops migrating from the Holchem/Brenntag facility and possibly other nearby facilities to the Price Pfister property.

11.2 DESCRIPTIONS OF RECOMMENDED REMEDIAL ACTIONS

The recommended remedial actions are described Sections 11.2.1 through 11.2.7.

11.2.1 SVE at Central Building P and Oil Staging Area

SVE systems at the Central Building P Area and Oil Staging Area will be operated as described in Section 11.1.1. Descriptions of the existing SVE systems are provided in Section 4.3.1 and their layous are shown on Figure 20. Locations for potential remediation systems after redeveloping the Site are shown on Figure 21.

11.2.2 IAS at Central Building P Area and Oil Staging Area

IAS will be added to the SVE systems at the Central Building P Area and Oil Staging Area. Six IAS wells, spaced approximately 30 feet apart, will be installed at each of these areas. The IAS wells will extend 20 to 30 feet into the saturated zone, which corresponds to depths of approximately 80 to 90 ft bgs. The bottom of each well will be completed with a 5-foot screen interval. The IAS well spacing of 30 feet is based upon review of available design guidance (Battelle Memorial Institute, 2002; Bass, et. al., 2000) and consideration of the permeable and relatively homogenous sandy gravels and gravelly sands that underlie the Price Pfister property.

Flexible hose housed inside steel piping will connect each of the IAS wells to a 5 hp air compressor at the Central Building P Area and Oil Staging Area. The air compressors are anticipated to be oil-less rotary vane types, which are designed to operate continuously. The air compressors will be equipped with inlet air particulate filters, heat exchangers, manual vents with gate valves, and pressure relief valves.

Given the coarse-grained characteristics of sandy gravels and gravelly sands comprising the saturated zone, it is expected that 20 scfm or more of air will be injected into each well. The IAS system will be operated in an automated pulsed mode. Typical IAS system operation might involve injecting 20 scfm of compressed air for 2 hours into a single well. After two 2 hours, a timer would close a flow control valve to the well and compressed air would be directed into the next well by opening the flow control valve to that well. The cycle of injecting compressed air into the six IAS wells individually for 2 hours would therefore repeat every 12 hours. The SVE systems will capture PCE removed from groundwater by IAS.

The IAS system will operate until the Site is redeveloped or the system is no longer efficient. According to a review conducted by Bass, et. al. (2000), remediation of dissolved VOCs in groundwater may be as short as 3 months or as long as 2 years. Layouts of the IAS systems before redeveloping the Site are shown on Figure 20.

11.2.3 FHP Collection at Building A Area

FHP collection at the Site has been occurring since late 1995. The FHP collection system currently consists of wells, MW-1, MW-2, MW-3. A dedicated airlift pump is installed in each well to extract FHP and groundwater. The pump intakes are set at a depth of approximately 50 ft bgs, which is near the interface of FHP and groundwater. Airlift pumps will be installed in wells PMW-16, PMW-17, and PMW-18 by May 2003. Wells PMW-16, PMW-17, and PMW-18 were constructed during the RI and found to contain FHP.

FHP and groundwater removed from the six wells will be transferred to a double-walled 525-gallon AST through double-contained, above-ground piping. An air compressor will be provided to operate the airlift pumps. The air compressor will automatically shut-off if liquid in the 525-gallon AST reaches a high level. Recovered FHP and extracted groundwater in the 525-gallon AST will be transported to an off-site, permitted facility for recycling.

As discussed in Section 11.1.1, the FHP collection system ultimately will be expanded from these six wells to a total of 10 to 15 wells. Layout of the FHP collection system before redeveloping the Site is shown on Figure 20. Potential layout of the FHP system after redeveloping the Site is shown on Figure 21.

11.2.4 Excavation of Non-VOC Sources in Soil at AOCs

Excavation of non-VOC sources in soil to a depth of 3 ft bgs at the Central Building P Area, Oil Staging Area, and Building L Area will be performed as buildings and pavement covering the sources are demolished during redevelopment of the Site unless final Site elevations planned as part of redevelopment call for covering the non-VOC sources with clean soil that would adequately limit direct contact with the contamination. Upon gaining access to non-VOC sources at each AOC, soil will be removed using standard excavation techniques until COC concentrations in soil from ground surface to 3 ft bgs are less than applicable remediation goals or RAOs are otherwise attained.

Soil samples will be collected from the sidewalls and floor of each excavation as specified in the RMP to confirm that the lateral extent of the contamination has been defined and removed and to evaluate if COCs will remain in soil deeper than 3 ft bgs. Clean soil will be imported and placed in the excavation. Excavated soil will be transported and disposed at an appropriate off-Site, permitted waste management facility. Figure 21 depicts the preliminary extents of excavation at each AOC based on available data. The actual extents of excavation may vary from those shown on Figure 21.

11.2.4.1 <u>Excavation at Central Building P Area</u>

Excavation at the Central Building P Area consists of removing the clarifier within the plating line and WWTS. The clarifier is 7 feet deep and soil adjacent and beneath the clarifier has been impacted by petroleum hydrocarbons as oils and, to a lesser degree, metals, and PCE in soil gas that appears to have sorbed into the petroleum hydrocarbons. It is assumed that removal of the clarifier will require the excavation and disposal of approximately 100 cubic yards of soil.

11.2.4.2 <u>Excavation at Building A Area</u>

As shown on Figure 9, petroleum hydrocarbons have been detected at concentrations greater than the remediation goal of 1,000 mg/kg at several places beneath Building A where petroleum hydrocarbons were historically stored or handled, including the former cutting oil USTs, the concrete trenches that contained the chip conveyor and cutting oil piping, the parts washer and the former clarifier into which wastewater from the parts washer discharged, and a portion of the trenches that contained non-contact cooling water piping for the die casting machines. It is assumed that approximately 1,200 cubic yards of petroleum hydrocarbon-containing soil will be excavated within the upper 3 feet at these places for off-Site disposal.

11.2.4.3 Excavation at Oil Staging Area

Excavation at the Central Building P Area consists of removing the containment sump. The containment sump is 3.5 feet deep and soil adjacent and beneath the clarifier has been impacted by PCE and petroleum hydrocarbons as oils. The SVE system operating at the Oil Staging Area is removing PCE but SVE is not likely to remove the heavier molecular weight petroleum hydrocarbons. It is assumed that removal of the clarifier will require the excavation and disposal of approximately 100 cubic yards of soil.

11.2.4.4 Excavation at Building L Area

Black sand and soil with metals or other COCs, including PCE, petroleum hydrocarbons, chrysene, phenanthrene, and pyrene, is present immediately beneath the pavement at the Building L Area. The black sand and soil is distributed over 45,000 square feet and has an average thickness of roughly 1 foot (Figure 13). It is assumed that approximately 1,500 cubic yards of black sand and soil will be excavated for off-Site disposal.

11.2.5 RMP

The RMP describes protocols to be implemented in conjunction with the recommended remedial actions at the AOCs before, during, and after redevelopment. The objectives of the RMP are to provide guidance and to establish a decision framework for managing COCs in soil and groundwater at the Site to protect human health and the environment while accomodating planned future uses of the Site. RMP protocols allow the safe redevelopment and reuse of the Site before and after remedial actions to address COC sources have been completed. RMP protocols are also intended to protect human health and the environment from COCs that may remain after the sources at the Site are remediated, and contamination that may exist at the Site and has yet to be discovered. Finally, RMP protocols address the potential for vapor intrusion from VOCs that may continue to migrate in groundwater to the Site from nearby facilities. The RMP is included as Appendix A.

11.2.6 Monitoring

Monitoring is an evaluation tool or data gathering activity to demonstrate the effectiveness of the selected remedial actions over time. Monitoring will include soil vapor and groundwater sampling to assess the performance of SVE and IAS at the Central Building P Area and Oil Staging Area, and measurements of FHP thickness in wells to assess the performance of FHP collection at the Building A Area. Monitoring details (e.g., wells to be sampled, analytes, sampling methods, and frequencies) will be specified in a plan to be submitted to RWQCB.

11.2.7 Land Use Restrictions

The Site is planned for industrial and/or commercial redevelopment. Land use will not change significantly (e.g., construction of residential dwellings) without RWQCB and other regulatory agencies exercising jurisdiction at the Site having the opportunity to review and, if necessary, revise the RAP/RMP based upon the proposed new land use. Because VOCs are known to be present in groundwater at concentrations greater than federal and State of California maximum contaminant levels for drinking water, groundwater at the Site will not be used as a source of drinking water or for any other purpose until such time that assessment of actual risks is performed and the RWQCB approves use of groundwater at the Site.

11.3 RESPONSIBILITY FOR RAP/RMP MANAGEMENT

As present owner of the Site, Price Pfister is responsible for managing implementation of the RAP/RMP. Price Pfister may assign some or all of the responsibility for implementing the RAP/RMP to the new owner of the Site with RWQCB concurrence.

11.4 RECOMMENDED REMEDIAL ACTION SCHEDULE

Current remedial actions (Section 11.1.1) have already been started or will be initiated soon as summarized below:

- SVE systems have been operating since September 2002 in accordance with a previously submitted work plan (EKI, 2002) and will continue to operate as described herein.

- IAS systems are being installed to be used with the SVE systems as described in a work plan submitted separately to RWQCB (EKI, 2003a). The IAS systems will be operational by mid-May 2003.

- FHP collection has been ongoing for several years. Wells PMW-16, PMW-17, and PMW-18 will be added to the existing system in May 2003. Expansion of the FHP collection system will be conducted as described in Section 11.1.1

Implementation of remedial actions that are contingent upon redevelopment (Section 11.1.2) are not scheduled at this time. RMP protocols will be performed as described in the RMP included as Appendix A.

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Table 1

Identification of Potentially Applicable or Relevant and Appropriate Requirements

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

ARAR or TBC	Citation, Authority, or Origin	Type	Locations	Description
Chemical-Specific ARARs and TBCs				
• Safe Drinking Water Act ("SDWA")	42 USC § 300g-1 Health and Safety Code § 116365, 22 CCR §§ 64431, 64432, 64432.1, 64432.2, 64444, 64444.5, 64449	applicable, chemical-specific (MCLs and non-zero MCLGs) to be considered, chemical-specific (secondary MCLs)	All locations at the Site.	The SDWA of 1974, as amended in 1977, 1986, and 1996, establishes minimum national primary drinking water standards known as maximum contaminant levels ("MCLs"). California may have more stringent MCLs ("California MCLs") established under Title 22 of the CCR. The NCP at 40 CFR §§300.430(e)(2)(i)(B)-(D) states that Maximum Contaminant Level Goals ("MCLGs"), established under the SDWA, that are set at levels above zero, will be attained by remedial actions for surface water or groundwater that are current or potential sources of drinking water. Remedial actions for groundwater shall achieve MCLs for COCs that do not have MCLGs, or for which the MCLGs have been set at zero. In addition to MCLGs and MCLs, U.S. EPA issues secondary MCLs for chemicals in drinking water that adversely affect its odor, taste, or appearance. However, secondary MCLs are not enforceable and are therefore TBCs.
• RWQCB, Los Angeles Region, Water Quality Control Plan ("Basin Plan") - Chapter 3	Porter-Cologne Water Quality Control Act promulgated under California Water Code			The Basin Plan identifies beneficial water uses in the Los Angeles area. Chapter 3 of the Basin Plan sets forth water quality objectives for surface waters and groundwaters.
--Pages 3-17 to 3-21: Objectives for Groundwaters	Basin Plan, pp. 3-17 to 3-21	applicable, chemical-specific	All locations at the Site.	Page 3-18 of the Basin Plan states that at a minimum, groundwaters designated for use as domestic or municipal supply shall not contain concentrations of organic and inorganic chemical constituents in excess of promulgated California MCLs. The Site is located in the San Fernando Valley Basins which are designated for potential use as domestic or municipal supply in Chapter 2 of the Basin Plan.

Table 1

Identification of Potentially Applicable or Relevant and Appropriate Requirements

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

ARAR or TBC	Citation, Authority, or Origin	Type	Locations	Description
Chemical-Specific ARARs and TBCs				
• Safe Drinking Water and Toxic Enforcement Act of 1986 ("Proposition 65")	Health & Safety Code § 25249.5 et seq.	applicable, chemical-specific	All locations at the Site.	Proposition 65 prohibits discharges of any chemical "known to the state to cause cancer or reproductive toxicity" to a potential source of drinking water. unless the discharge poses no significant effect. Proposition 65 also requires "clear and reasonable" warnings to be provided before a significant exposure to any of these chemicals can occur. Cal / EPA, Office of Environmental Health Hazard Assessment ("OEHHA") is responsible for determining and listing chemicals "known to the state to cause cancer or reproductive toxicity." No exposure, discharge, or release has occurred for purposes of Proposition 65 if the concentration of a listed chemical to which an individual is exposed poses "no significant risk." OEHHA has provided default "no significant risk levels" ("NSRLs") for certain listed chemicals, which are promulgated in 22 CCR §§ 12705, 12709, and 12805. Proposition 65 also provides guidance on developing NSRLs.
• Toxic Substances Control Act ("TSCA")	15 USC §§ 2602, 2605(e) (regulation of PCBs); 40 CFR 761.1-761.3 (definitions) & Subparts C (§§ 761.40-.45) (marking of PCBs and PCB items), D (§§ 761.50-.79) (storage and disposal of PCBs), G (§§ 761.120-.135) (PCB spill cleanup policy), J & K (§§ 761.180-.193, 202-.218) (PCB record keeping, monitoring and reports), N-R (§§ 761.260-.359) (sampling and analysis of PCB waste)	relevant and appropriate, chemical-specific (Subparts C, D, J, K, N - R) to be considered, chemical-specific (Subpart G spill spill cleanup standards)	Any location at the Site where PCBs are encountered.	TSCA regulates the use and disposal of various chemicals, including PCBs. Subpart D of 40 CFR Part 761 outlines disposal and cleanup procedures for "PCB remediation waste" (i.e. waste with a PCB concentration of at least 50 ppm) [40 CFR §§ 761.60-.61] and prohibits the unpermitted discharge of PCBs to navigable waters or a treatment works at more than 3 ppb concentration [id. § 761.50(a)(3)]. Certain PCB remediation waste in soil must be cleaned up and disposed of in accordance with Section 761.61. Certain liquid PCB remediation waste must be incinerated or otherwise disposed of in accordance with Section 761.60(a) or (e) [id. § 761.61(b)]. Subpart G establishes standards for cleanup of certain PCB spills of at least 50 ppm concentration occurring after May 4, 1987. Subparts J and K impose notification and reporting requirements under specified circumstances on facilities using or disposing PCBs. TSCA also contains specified requirements for labeling of containers and equipment with PCB-containing materials, and of transport vehicles carrying a certain amount of liquid PCBs (id. § 761.40).

Table 1

Identification of Potentially Applicable or Relevant and Appropriate Requirements

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

ARAR or TBC	Citation, Authority, or Origin	Type	Locations	Description
Chemical-Specific ARARs and TBCs				
• RWQCB Soil Screening Levels	Porter-Cologne Water Quality Control Act promulgated under California Water Code			RWQCB soil screening levels are developed and discussed in the RWQCB *Interim Site Assessment and Cleanup Guidebook*. This guidance describes the procedures involved in the site assessment and cleanup process for sites in the Los Angeles Area. Chapter 4 of the Guidebook addresses petroleum-impacted sites, and Chapter 5 sets forth soil screening levels for VOC-impacted sites.
--Pages 4-1 to 4-4: Guidance for Petroleum-Impacted Sites: Soil Screening Levels; Pages 5-1 to 5-6: Guidance for VOC-Impacted Sites: Soil Screening Levels	RWQCB *Interim Site Assessment & Cleanup Guidebook*, pp. 4-1 to 4-4, pp. 5-1 to 5-6.	to be considered, chemical-specific	Any location at the Site with petroleum- or VOC-impacted soil.	Chapter 4 presents screening levels for TPH and BTEX in soil that overlies a drinking water aquifer. Chapter 5 provides a methodology for calculating screening levels for VOCs in soil. These soil screening levels are designed to protect groundwater quality and are intended to be used primarily to evaluate whether a chemical release at the Site may pose a risk that warrants further investigation. Consideration of these screening levels may be appropriate when developing risk-based remediation goals for the Site.
• RWQCB, San Francisco Bay Region, Risk-Based Screening Levels ("RBSLs")	RWQCB, San Francisco Bay Region. 24 December 2002. *Interim Soil Gas Screening Levels for Evaluation of Potential Indoor-Air Impacts and Request for Comments.* Memorandum from Roger Brewer, Toxics Cleanup Division, SF Bay Region RWQCB	to be considered, chemical-specific	All locations at the Site.	The San Francisco Bay RWQCB has released interim soil gas screening levels and interim final soil and groundwater RBSLs for over 100 chemicals commonly found at Sites where releases of hazardous substances have occurred. RBSLs are calculated assuming target risk levels of a Hazard Index of 0.2 for non-carcinogens and an incremental lifetime cancer risk of 10^{-6} for carcinogens. RBSLs are used primarily to evaluate whether a chemical release may pose a risk at the Site that warrants further investigation. In addition, RBSLs can be used, if appropriate, as cleanup levels if Site-specific cleanup levels are not available. Interim soil gas screening levels were employed to identify chemicals of concern at the Price Pfister property and are included as chemical specific TBCs for all locations at the Site.

Table 1

Identification of Potentially Applicable or Relevant and Appropriate Requirements

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

ARAR or TBC	Citation, Authority, or Origin	Type	Locations	Description
Chemical-Specific ARARs and TBCs				
• U.S. EPA Region IX Preliminary Remediation Goals ("PRGs")	U.S. EPA. 1 October 2002. *Region 9 Preliminary Remediation Goals (PRGs) 2002.* Memorandum from Stanford J. Smucker, Ph. D., Regional Toxicologist (SFD-8-B), Technical Support Team to PRG Table Users.	to be considered, chemical-specific	All locations at the Site.	U.S. EPA Region IX PRGs are risk-based screening levels for evaluating chemical impacts to a site. Concentrations of chemicals detected at a site greater than their respective PRGs do not automatically trigger a response action. Instead, exceeding a U.S. EPA PRG suggests that further evaluation of the potential risks posed by chemicals at the site is appropriate. Further evaluation may include additional sampling, consideration of naturally occurring or ambient levels of the chemicals in the environment, or performance of a more detailed risk assessment to account for site-specific conditions and determine if remedial actions are warranted. U.S. EPA commercial and industrial soil and tap water PRGs were used to identify COCs at the Price Pfister property.
• U.S. EPA Soil Screening Levels	U.S. EPA. *Soil Screening Guidance.* 1996. *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* December 2002.	to be considered, chemical-specific	All locations at the Site.	Together, these documents describe three approaches to establishing soil screening levels ("SSLs") for a given site. SSLs are soil contaminant concentrations below which no further action or study regarding soil at a site is warranted under CERCLA, provided conditions associated with the SSLs are met. SSL target risk levels are a hazard index of 1 for non-carcinogens and an incremental lifetime cancer risk of 10^{-6} for carcinogens. The first approach is to rely upon generic numerical values calculated from standardized sets of equations. The second approach is to rely upon site-specific data for imput values in the equations. The third approach is to employ site-specific models in lieu of the equations. EKI followed the second approach in calculating remediation goals for the Price Pfister property. Consequently, the methodology used to establish SSLs are considered chemical-specific TBCs for all locations at the Site.

Table 1

Identification of Potentially Applicable or Relevant and Appropriate Requirements

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

ARAR or TBC	Citation, Authority, or Origin	Type	Locations	Description
Location-Specific ARARs and TBCs				
• Basin Plan - Chapter 2	Authority: Porter-Cologne Water Quality Control Act promulgated under California Water Code			The Basin Plan identifies beneficial water uses in the Los Angeles area. Chapter 2 designates beneficial water uses for specific waterbodies in the region.
--Pages 2-3 to 2-5: Beneficial Uses for Specific Waterbodies	Basin Plan, pp. 2-3 to 2-5; Table 2-2	applicable, location-specific	All locations at the Site.	Table 2-2 indicates that beneficial uses of groundwater in the San Fernando Valley Groundwater Basins, in which the Site is located, include municipal, domestic, agricultural, and industrial supply.
• SWRCB Resolution No. 88-63	Authority: Porter-Cologne Water Quality Control Act promulgated under California Water Code	applicable, location-specific	All locations at the Site.	The resolution states that all surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply, unless the surface or groundwaters contain total dissolved solids in excess of 3,000 mg/L, the waters contain high levels of contamination, or the water source does not provide sufficient water to supply a well capable of producing 200 gallons per day.
Action-Specific ARARs and TBCs				
• SWRCB Resolution No. 68-16	Authority: Porter-Cologne Water Quality Control Act promulgated under California Water Code	applicable, action-specific	Any location at the Site with impacted soil.	This resolution, the Antidegradation policy, implements the requirement contained in 40 CFR § 131.12 that existing instream water uses and the level of water quality necessary to protect existing uses be maintained and protected. The Antidegradation policy applies to both surface and groundwater. It may apply to cleanup activities that lead to discharge into State waters, including groundwater. RWQCB enforces the Antidegradation Policy, in part, by requiring soil to be remediated such that the beneficial uses of groundwater and surface water are protected from COCs that may leach or otherwise migrate from impacted soil.

Table 1
Identification of Potentially Applicable or Relevant and Appropriate Requirements
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

ARAR or TBC	Citation, Authority, or Origin	Type	Locations	Description
Action-Specific ARARs and TBCs				
• SWRCB Resolution No. 92-49	Authority: Porter-Cologne Water Quality Control Act promulgated under California Water Code	applicable, action-specific	Any locations at the Site where groundwater impacts are identified.	Resolution No. 92-49 establishes policies and procedures for investigating and remediating chemical releases that affect or threaten water quality. In particular, it sets forth procedures that the Regional Water Board shall apply in determining whether a person shall be required to investigate a discharge, or to clean up waste and abate the effects of a discharge under Water Code Section 13304, and the procedures the Regional Water Board shall follow in reviewing investigative and cleanup and abatement proposals.
• Hazardous Waste Requirements	Cal. Health & Safety Code §§ 25100-25249, 25250-25250.26, 25260-25929; 22 CCR §§ 66260.1-68500.35 (standards for management of hazardous waste). Federal statutes may apply to areas not covered by state program, or where incorporated by reference [see 42 USC §§ 6901-6991i; 40 CFR Parts 260-282; 49 CFR Parts 172, 173, 178, 179 (transportation)].			California has been authrorized to implement the federal RCRA program with its own hazardous waste control laws and regulations. Health & Safety ("H&S") Code Sections 25110 to 25124 contain definitions of terms (e.g. "waste," "hazardous waste," "hazardous waste facility") used generally throughout the statutes and regulations. The term "hazardous waste" includes, but is not limited to, any substance qualifying as a "hazardous waste" under RCRA. See H&S Code §§ 25117(b).

Table 1

Identification of Potentially Applicable or Relevant and Appropriate Requirements

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

ARAR or TBC	Citation, Authority, or Origin	Type	Locations	Description
Action-Specific ARARs and TBCs				
• Hazardous Waste Requirements (continued) --Generation, Transport and Disposal regulations	Cal. Health & Safety Code §§ 25100-25166.5, 25179.1-.12 (land disposal restrictions ("LDRs")), 25244-25244.24 (waste reduction and recycling); 22 CCR §§ 66260.10-66262.41, 66264.1-.172, 66265.16-.199; 66268.10-.44, .105-.113 (LDRs and treatment standards); 49 CFR Parts 172, 173, 178, 179 (transportation) [incorporated by reference]	relevant and appropriate, action-specific	Any location at the Site where remedial action results in generation, transport, or disposal of hazardous wastes.	Generators of hazardous waste must observe certain requirements in accumulating, storing, marking and treating the waste while on-site, and in preparing and labeling the waste for transport and disposal off-site. (H&S Code §§ 25123.3 (accumulation); 25123.5 & 25201 (treatment); 25160-25166.5 (transport), 25244.4; 22 CCR §§ 66260.200; 66262.10-.41; 66264.1-.172; 66265.170-.177 (container storage), .190-.199 (tank storage)). Persons responsible for handling and transporting waste must receive appropriate training, and contingency/emergency planning and procedures must be in place (22 CCR §§ 66262.34; 66265.16, .30-.37, .50-.56). Required records must be kept (22 CCR 66262.40). These requirements may be relevant and appropriate to any future generation of hazardous wastes through remediation activities (e.g. during drilling and excavating), including manifesting and transporting those wastes off site (22 CCR §§ 66262.10-66262.47).
• Solid (Non-Hazardous) Waste Requirements	Cal. Pub. Res. Code §§ 40000-40201; 27 CCR §§ 20200, 20220	relevant and appropriate, action-specific	Any location at the Site where remedial action results in generation, transport, or disposal of non-hazardous wastes.	These regulations address the disposal of solid waste in California. Specifically, the regulations outline a waste classification system that considers the potential for water quality degradation by each category of waste. Standards for handling and disposal of solid, non-hazardous waste are based upon this waste classification system.

Table 1

Identification of Potentially Applicable or Relevant and Appropriate Requirements

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

ARAR or TBC	Citation, Authority, or Origin	Type	Locations	Description
Action-Specific ARARs and TBCs				
• Federal Clean Air Act, certain South Coast Air Quality Management District ("SCAQMD") Regulations	SCAQMD Regulations			SCAQMD is the local implementing agency for Federal Clean Air Act requirements. Applicable or relevant and appropriate SCAQMD rules and regulations regarding remedial actions are discussed below.
-- Air Requirements	SCAQMD Regulation 4, Rule 403 and 404	relevant and appropriate, action-specific	Any location at the Site where earthwork or other acts of remediation and removal of soil and debris may occur.	SQAQMD Regulation 4 (Prohibitions), Rules 403 (Fugitive Dust) and 404 (Particulate Matter - Concentration) limit the emission of particulates. Excavation and removal of material during remediation activities may result in emissions of particulates and may necessitate implementation of controls.
-- Air Requirements	SCAQMD Regulation 11, Rule 1166	applicable, action-specific	Any location at the Site with VOC-impacted soil.	SCAQMD Regulation 11 (Source Specific Standards), Rule 1166 (Volatile Organic Compound Emissions from Decontamination of Soil) seeks to control VOC emissions during remediation of impacted soil.
-- Air Requirements	SCAQMD Regulation 11, Rules 1108 and 1108.1	relevant and appropriate, action-specific	Any location at the Site where remediation activities include asphaltic paving.	SCAQMD Regulation 11 (Source Specific Standards), Rules 1108 (Cutback Asphalt) and 1108.1 (Emulsified Asphalt) prohibit the use of certain types of liquid and emulsified asphalts (those that would emit relatively large amounts of organic compounds). Use of asphalts not prohibited by this rule will need to be considered.

Table 1

Identification of Potentially Applicable or Relevant and Appropriate Requirements

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
BTEX	Benzene, toluene, ethylbenzene, and xylenes
Cal/EPA	California Environmental Protection Agency
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemical of Concern
CTR	California Toxics Rule
H&S	Health and Safety
LDR	Land Disposal Restriction
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
OEHHA	California Environmental Protection Agency, Office of Environmental Health Hazard Assessment
OSWER	Office of Solid Waste and Emergency Response
PCB	Polychlorinated Biphenyl
PRG	Preliminary Remediation Goal
RBSL	Risk-Based Screening Level
RCRA	Resource Conservation and Recovery Act
RWQCB	California Environmental Protection Agency, Regional Water Quality Control Board, Los Angeles Region
SCAQMD	South Coast Air Quality Management District
SDWA	Safe Drinking Water Act
SIP	State Implementation Plan
SWRCB	California Environmental Protection Agency, State Water Resources Control Board
TBC	To-Be-Considered
TPH	Total Petroleum Hydrocarbons
TSCA	Toxic Substances Control Act
U.S. EPA	United States Environmental Protection Agency
USC	United States Code
VOC	Volatile Organic Compound

Table 2

Numeric Values of Potential Chemical-Specific ARARs (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	State of California Maximum Contaminant Levels (ug/L); (2)	U.S. EPA Maximum Contaminant Levels (ug/L); (3)	Los Angeles Region RWQCB Maximum Soil Screening Levels above Drinking Water Aquifers (mg/kg); (4)	U.S. EPA Region IX Preliminary Remediation Goals ("PRGs") for Direct Contact Exposure Pathways		San Francisco Bay RWQCB Risk-Based Screening Levels ("RBSLs") for Occupational Shallow Soil Gas (µg/L); (6)
				Industrial Soil (mg/kg); (5)	Tap Water (µg/L); (5)	
VOCs						
Primary VOCs						
Tetrachloroethene	5	5	--	3.4	0.66	12
1,1,1-trichloroethane	200	200	--	1,200	3,200	4,800
Trichloroethene	5	5	--	0.11	0.028	33
cis-1,2-dichloroethene	6	70	--	150	61	170
1,1-dichloroethene	6	--	--	410	340	1.4
Secondary VOCs						
1,1-dichloroethane	5	--	--	1,700	810	43
1,2-dichloroethane	0.5	5	--	0.60	0.12	3.2
trans-1,2-dichloroethene	10	100	--	230	120	330
Vinyl Chloride	0.5	2	--	0.75 (7)	0.020 (8)	0.87
Bromomethane	8.7	--	--	13	8.7	25
Chloroform	6.2	80	--	12	6.2	13
Trichlorofluoromethane	150	--	--	2,000	1,300	--
Benzene	1	5	20 feet = 0.011 80 feet = 0.033 (9)	1.3	0.34	2.3
Toluene	150	1,000	20 feet = 0.3 80 feet = 2 (9)	520	720	2,000
Ethylbenzene	700	700	20 feet = 0.7 80 feet = 7 (9)	20	2.9	4,800
Total Xylenes	1,750	10,000	20 feet = 1.75 80 feet = 20 (9)	420	210	3,300
Non-VOCs						
Petroleum Hydrocarbons						
Total Extractable Petroleum Hydrocarbons	--	--	1,000 (10)	--	--	530 (11)
Metals and Cyanide						
Chromium	50	--	--	450	--	--
Hexavalent Chromium	--	--	--	64	110	--
Copper	--	--	--	41,000	1,500	--
Lead	--	--	--	750 (12)	--	--
Nickel	100	--	--	20,000 (13)	730 (13)	--
Zinc	--	--	--	100,000	11,000	--
Cyanide	200	--	--	12,000 (14)	730 (14)	--
Semi-Volatile Organic Compounds						
Chrysene	--	--	--	210	9.2	--
Phenanthrene	--	--	--	--	--	--
Pyrene	--	--	--	29,000	180	530

Table 2

Numeric Values of Potential Chemical-Specific ARARs (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	U.S. EPA Generic Soil Screening Levels ("SSLs") for Commercial / Industrial Scenario (15)					
	Outdoor Worker Receptor				Indoor Worker Receptor	
	Ingestion-Dermal (mg/kg)	Inhalation of Volatiles (mg/kg)	Inhalation of Fugitive Particulates (mg/kg)	Migration to Groundwater DAF = 20 (mg/kg)	Ingestion-Dermal (mg/kg) (16)	Migration to Groundwater DAF = 20 (mg/kg)
VOCs						
Primary VOCs						
Tetrachloroethene	6 (17)	2	--	0.06	11	0.06
1,1,1-trichloroethane	-- (17)	1,200	--	2	-- (17)	2
Trichloroethene (18)	8 (17)	0.1	--	0.06	14	0.06
cis-1,2-dichloroethene	11,000 (17)	-- (19)	--	0.4	20,000	0.4
1,1-dichloroethene	57,000 (17)	410 (19)	--	0.06	100,000	0.06
Secondary VOCs						
1,1-dichloroethane	110,000 (17)	1,700	--	23	200,000	23
1,2-dichloroethane	35 (17)	0.6	--	0.02	63	0.02
trans-1,2-dichloroethene	23,000 (17)	--	--	0.7	41,000	0.7
Vinyl Chloride	4 (17) (20)	1	--	0.01	8 (20)	0.01 (20) (21) (22)
Bromomethane	1,600 (17)	13 (19)	--	0.2 (17)	2,900	0.2
Chloroform	11,000 (17)	-- (19)	--	0.6	20,000	0.6
Trichlorofluoromethane	--	--	--	--	--	--
Benzene	58 (17)	1	--	0.03	100	0.03
Toluene	230,000 (17)	650	--	12	410,000	12
Ethylbenzene	110,000 (17)	400	--	13	200,000	13
Total Xylenes	1,000,000 (17)	-- (19)	--	200	1,000,000	210 (23)
Non-VOCs						
Petroleum Hydrocarbons						
Total Extractable Petroleum Hydrocarbons	--	--	--	--	--	--
Metals and Cyanide						
Chromium	3,400 (17)	--	510	38 (22)	6,100	38 (22)
Hexavalent Chromium	3,400 (17)	--	510	38 (22)	6,100	38 (22)
Copper	--	--	--	--	--	--
Lead	--	--	--	--	--	--
Nickel	23,000 (17)	--	26,000	130 (22)	41,000	130 (22)
Zinc	340,000 (17)	--	-- (17)	12,000 (22)	610,000	12,000 (22)
Cyanide (24)	23,000 (17)	--	-- (17)	40	41,000	40
Semi-Volatile Organic Compounds						
Chrysene	230	-- (19)	--	160	780	160
Phenanthrene	--	--	--	--	--	--
Pyrene	18,000	-- (19)	--	4,200	61,000	4,200

Table 2

Numeric Values of Potential Chemical-Specific ARARs (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

mg/L = milligram per liter
mg/kg = milligram per kilogram
DAF = Dilution Attenuation Factor

Notes

(1) Numeric values for chemical-specific ARARs are listed in this table.

(2) State of California Maximum Contaminant Level for drinking water, where available, as found in Title 22 of the California Code of Regulations.

(3) Federal Maximum Contaminant Level for drinking water, where available, as found in 40 CFR.

(4) Maximum soil screening levels for total petroleum hydrocarbons ("TPH") and benzene, toluene, ethylbenzene, and xylenes ("BTEX") above drinking water aquifers are from Table 4-1 of Los Angeles Region RWQCB *Interim Site Assessment & Cleanup Guidebook,* May 1996.

(5) U.S. EPA Region IX Preliminary Remediation Goals ("PRGs"), dated 1 October 2002, where available, for direct contact exposure pathways for industrial soil and tap water.

(6) San Francisco Bay Regional Water Quality Control Board ("RWQCB") (December 2001) Risk-Based Screening Levels ("RBSLs"), where available, for occupational shallow soils gas.

(7) The vinyl chloride PRG for direct contact exposure pathway for industrial soil is for adults.

(8) The vinyl chloride PRG for direct contact exposure pathway for tap water is for children/adults. EPA applied a non-standard method to determine the vinyl chloride PRG.

(9) Values for BTEX are for sandy soils at 20 feet and 80 feet above the groundwater table.

(10) Value for TPH is for carbon range of C13 to C22 at 20 to 150 feet above the groundwater table.

(11) RBSL value for Total Extractable Petroleum Hydrocarbon is based on TPH middle distillates.

(12) EPA applied a non-standard method to determine the lead PRG for direct contact exposure pathway for industrial soil.

(13) The values listed here are the PRGs for "nickel (soluble salts)."

(14) The values listed here are the PRGs for "cyanide (hydrogen)."

(15) U.S. EPA generic soil screening levels ("SSLs") for commercial/industrial scenario as can be found in Exhibits A-2 and A-3 in *Supplementary Guidance for Developing Soil Screening Levels for Superfund Sites,* December 2002. SSLs are calculated based on a 10^{-6} incremental lifetime cancer risk and a noncarcinogenic hazard index of 1.

(16) No dermal adsorption data available for indoor worker receptor; calculated based on ingestion data only

(17) No dermal absorption data available; SSL calculated based on ingestion data only.

(18) Health benchmark values are based on NCEA's *Trichloroethylene Health Risk Assessment: Synthesis and Characterization - External Review Draft* (ORD, August, 2001). The trichloroethylene draft risk assessment is still under review. As a result, the health benchmark values are subject to change.

(19) No toxicity criteria available.

(20) SSL is based on continuous exposure to vinyl chloride during adulthood.

(21) Level is at or below Contract Laboratory Program required quantification limit for Regular Analytical Services.

(22) SSL has been determined at a pH of 6.8.

(23) SSL listed is that for o-xylene isomer. SSL for m-xylene is 210 mg/kg and p-xylene is 200 mg/kg.

(24) SSLs listed are for amenable cyanide.

Table 3

Numeric Values of Potential Action-Specific ARARs (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Characteristic Hazardous Waste Classification: Toxicity Characteristic Leaching Procedure ("TCLP") (mg/L); (2)	Soluble Threshold Limit Concentration ("STLC") (mg/L); (2)	Total Threshold Limit Concentration ("TTLC") (mg/kg); (2)	Universal Treatment Standards for Underlying Hazardous Constituents (mg/kg or mg/L TCLP); (3)	City of Los Angeles Discharge Limitations to Sanitary Sewer (mg/L); (4)
VOCs					
Primary VOCs					
Tetrachloroethene	0.7	--	14	6.0	--
1,1,1-trichloroethane	--	--	--	6.0	--
Trichloroethene	0.5	204	2,040	6.0	--
cis-1,2-dichloroethene	--	--	--	--	--
1,1-dichloroethene	0.7	--	--	6.0	--
Secondary VOCs					
1,1-dichloroethane	--	--	--	6.0	--
1,2-dichloroethane	0.5	--	--	6.0	--
trans-1,2-dichloroethene	--	--	--	30	--
Vinyl Chloride	0.2	--	--	6.0	--
Bromomethane	--	--	--	15	--
Chloroform	6.0	--	--	6.0	--
Trichlorofluoromethane	--	--	--	30	--
Benzene	0.5	--	--	10	--
Toluene	--	--	--	10	--
Ethylbenzene	--	--	--	10	--
Total Xylenes	--	--	--	30	--
Non-VOCs					
Petroleum Hydrocarbons					
Total Extractable Petroleum Hydrocarbons	--	20,000	--	--	--
Metals and Cyanide					
Chromium	5.0	5	2,500	0.60 (6)	10.00
Hexavalent Chromium	--	5	500	--	--
Copper	--	25	2,500	--	15.00
Lead	5.0	5.0	1,000	0.75 (6)	5.00
Nickel	--	20	2,000	11 (6)	12.00
Zinc	--	250	5,000	4.3 (6)	25.00
Cyanide		--	--	590 (6)	10.00
Semi-Volatile Organic Compounds					
Chrysene	--	--	--	3.4	--
Phenanthrene	--	--	--	5.6	--
Pyrene	--	--	--	8.2	--

Table 3

Numeric Values of Potential Action-Specific ARARs (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Non-hazardous Waste Classification			
	Designated Waste		Non-hazardous Solid Waste	
	STLC Maximum Concentration Permissible (mg/L); (5)	TTLC Maximum Concentration Permissible (mg/kg); (5)	STLC Maximum Concentration Permissible (mg/L); (5)	TTLC Maximum Concentration Permissible (mg/L); (5)
VOCs				
Primary VOCs				
Tetrachloroethene	--	--	--	--
1,1,1-trichloroethane	--	--	--	--
Trichloroethene	204	2,040	--	--
cis-1,2-dichloroethene	--	--	--	--
1,1-dichloroethene	--	--	--	--
Secondary VOCs				
1,1-dichloroethane	--	--	--	--
1,2-dichloroethane	--	--	--	--
trans-1,2-dichloroethene	--	--	--	--
Vinyl Chloride	--	--	--	--
Bromomethane	--	--	--	--
Chloroform	--	--	--	--
Trichlorofluoromethane	--	--	--	--
Benzene	--	--	--	(8)
Toluene	--	--	--	(8)
Ethylbenzene	--	--	--	(8)
Total Xylenes	--	--	--	(8)
Non-VOCs				
Petroleum Hydrocarbons				
Total Extractable Petroleum Hydrocarbons	--	(9)	--	(8)
Metals and Cyanide				
Chromium	560	2,500	--	--
Hexavalent Chromium	5	500	0.5 (10)	0.05
Copper	25	2,500	20	2
Lead	5.0	1,000	1.5	0.15
Nickel	20	2,000	1	0.1
Zinc	250	5,000	200	20
Cyanide	--	(11)	--	(11)
Semi-Volatile Organic Compounds				
Chrysene	--	--	--	--
Phenanthrene	--	--	--	--
Pyrene	--	--	--	--

Table 3

Numeric Values of Potential Action-Specific ARARs (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

mg/L = milligram per liter
mg/kg = milligram per kilogram

Notes

(1) Numeric values for action-specific ARARs are listed in this table. See Table 1 for complete listing and synopses of ARARs and TBCs.

(2) Waste classification criteria are from 22 CCR 66261.24.

(3) Universal treatment standards for underlying hazardous constituents from 40 CFR 268.48(a). Unless otherwise noted, values are in units of mg/kg.

(4) An industrial wastewater permit must be obtained before disposal into City of Los Angeles sanitary sewers. The City of Los Angeles determines in the permitting process whether COCs are at acceptable concentrations for disposal. Some local limits have been established for some metals and cyanide. These values can be found in *Guide for Discharging Industrial Wastewater to the Sewer*, City of Los Angeles Department of Public Works, Bureau of Sanitation, 1997.

(5) Non-hazardous waste disposal requirements are from Altamont Landfill and Resources Recovery Facility, revised June 1999. Values listed are specific to Waste Management's Altamont facility. Acceptance of wastes are at the discretion of permitted waste management facility. Consequently, non-hazardous waste disposal requirements may vary by facility.

(6) Values noted are in units of mg/L as measured in the Toxicity Characteristic Leaching Procedure extract.

(7) Pursuant to HSC §25157.8, additional criteria pertain to the management of lead, copper, or nickel contaminated waste. Waste containing total lead greater than 350 mg/kg, copper greater than 2,500 mg/kg, or nickel greater than 2,000 mg/kg must be disposed at a permitted hazardous waste management facility, unless the waste discharge requirements and solid waste facility permit of a non-hazardous waste management facility specifically allow for the disposal of these types of wastes. HSC §25157.8 remains in effect until 1 July 2006, and as of that date is repealed unless a later statute is enacted that repeals or extends the 1 July 2006 sunset provision.

(8) The maximum acceptance concentration of diesel is 100 ppm analyzed by EPA Method 8015M, gasoline is non detect by EPA Method 8015, and Benzene, Toluene, Ethylbenzene, and Xylenes ("BTEX") is non detect by EPA Method 8020.

(9) The maximum acceptance concentration of motor oil is 10,000 ppm, diesel is 20,000 ppm, and gasoline is 5,900 ppm. Materials which contain TPH above these levels are acceptable if they pass the 96 hour static aquatic toxicity text (fish bioassay).

(10) At the discharger's discretion, may be met based on Total Chromium analyses, provided that total chromium analyses is below 0.5 mg/L

(11) The TTLC for cyanide is 250 mg/kg of hydrogen cyanide.

Table 4

Remediation Goals for Chemicals of Concern in Soil

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goal (1)		Human Health Remediation Goal (2)	
		Soil (mg/kg)	Soil Gas (μg/L) (3)	Soil (mg/kg)	Soil Gas (μg/L) (3)
		VOCs			
Primary VOCs					
Tetrachloroethene	0 - 3	3.7	5,200	0.28	380
	3 - 30	0.045	63	0.031	43
	30 - 60	0.011	15	0.028	38
1,1,1-trichloroethane	0 - 3	69	89,000	290	370,000
	3 - 30	0.85	1,100	65	83,000
	30 - 60	0.21	270	58	75,000
Trichloroethene	0 - 3	2.85	4,700	0.72	1,200
	3 - 30	0.036	60	0.091	150
	30 - 60	0.0088	14	0.082	130
cis-1,2-dichloroethene	0 - 3	2.4	4,100	16	27,000
	3 - 30	0.043	73	2.3	3,900
	30 - 60	0.0094	16	2.0	3,500
1,1-dichloroethene	0 - 3	1.3	5,500	16	65,000
	3 - 30	0.016	68	4.5	19,000
	30 - 60	0.0043	18	4.1	17,000
Secondary VOCs					
1,1-dichloroethane	0 - 3	1.7	3,800	1.0	2,200
	3 - 30	0.028	61	0.11	250
	30 - 60	0.0062	14	0.10	220
1,2-dichloroethane	0 - 3	0.168	370	0.078	170
	3 - 30	0.0080	18	0.0086	19
	30 - 60	0.0014	3.0	0.0078	17
trans-1,2-dichloroethene	0 - 3	3.6	9,500	22	56,000
	3 - 30	0.048	120	4.5	12,000
	30 - 60	0.012	33	4.1	11,000
Vinyl Chloride	0 - 3	0.089	430	0.021	100
	3 - 30	0.0011	5.4	0.0023	10
	30 - 60	0.00030	1.5	0.0021	10
Bromomethane	0 - 3	2.5	7,100	1.4	4,200
	3 - 30	0.037	110	0.32	940
	30 - 60	0.0085	25	0.29	840
Chloroform	0 - 3	31.86	48,000	0.31	470
	3 - 30	0.571	860	0.034	52
	30 - 60	0.133	200	0.031	47
Trichlorofluoromethane	0 - 3	77	98,000	240	310,000
	3 - 30	0.96	1,200	45	58,000
	30 - 60	0.12	150	41	52,000

Table 4

Remediation Goals for Chemicals of Concern in Soil

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goal (1)		Human Health Remediation Goal (2)	
		Soil (mg/kg)	Soil Gas (µg/L) (3)	Soil (mg/kg)	Soil Gas (µg/L) (3)
VOCs					
Secondary VOCs					
Benzene	0 - 3	0.43	770	0.057	100
	3 - 30	0.0064	11	0.0064	11
	30 - 60	0.0015	2.7	0.0057	10
Toluene	0 - 3	120	130,000	160	180,000
	3 - 30	1.6	1,700	19	21,000
	30 - 60	0.38	420	17	19,000
Ethylbenzene	0 - 3	52	40,000	52	40,000
	3 - 30	11	8,500	52	40,000
	30 - 60	2.6	2,000	52	40,000
Total Xylenes	0 - 3	58	30,000	58	30,000
	3 - 30	30	16,000	45	24,000
	30 - 60	7.1	3,700	41	21,000
Non-VOCs					
Petroleum Hydrocarbons					
Total Extractable	0 - 3	--	--	1,000	--
Petroleum Hydrocarbons	3 - 30	--	--	1,000	--
	30 - 60	--	--	1,000	--
Metals and Cyanide					
Chromium	0 - 3	--	--	1,900	--
	3 - 30	--	--	1,900	--
	30 - 60	--	--	1,900	--
Hexavalent Chromium	0 - 3	7.6	--	270	--
	3 - 30	1.1	--	270	--
	30 - 60	0.99	--	270	--
Copper	0 - 3	--	--	7,700	--
	3 - 30	--	--	7,700	--
	30 - 60	--	--	7,700	--
Lead	0 - 3	--	--	740	--
	3 - 30	--	--	740	--
	30 - 60	--	--	740	--
Nickel	0 - 3	--	--	3,700	--
	3 - 30	--	--	3,700	--
	30 - 60	--	--	3,700	--
Zinc	0 - 3	--	--	63,000	--
	3 - 30	--	--	63,000	--
	30 - 60	--	--	63,000	--

Table 4

Remediation Goals for Chemicals of Concern in Soil

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goal (1)		Human Health Remediation Goal (2)	
		Soil (mg/kg)	Soil Gas (µg/L) (3)	Soil (mg/kg)	Soil Gas (µg/L) (3)
Non-VOCs					
Metals and Cyanide					
Cyanide	0 - 3	4,200	--	4,200	--
	3 - 30	4,200	--	4,200	--
	30 - 60	4,200	--	4,200	--
Semi-Volatile Organic Compounds					
Chrysene	0 - 10	1,000,000	11,000	14	0.15
	10 - 35	21,000	220	14	0.15
	35 - 60	330	3.5	14	0.15
Phenanthrene	0 - 10	1,000,000	8,600	37,000	320
	10 - 35	1,000,000	8,600	37,000	320
	35 - 60	30,000	260	37,000	320
Pyrene	0 - 10	1,000,000	4,700	4,300	20
	10 - 35	880,000	4,100	4,300	20
	35 - 60	1,900	8.9	4,300	20

Abbreviations

-- not calculated
ft bgs feet below ground surface
mg/kg milligrams per kilogram
µg/L micrograms per liter
SVOC semi-volatile organic compound
VOC volatile organic compound

Notes

(1) Groundwater protection remediation gaols are VOC and hexavalent chromium concentrations in soil that are calculated not to result in VOC and hexavalent chromium concentrations in groundwater that are greater than relevant maximum contaminant levels or preliminary remediation goals. Groundwater protection remediation goals are required only for VOCs and hexavalent chromium because other metals, SVOCs, and petroleum hydrocarbons as oils remaining in soil at the Site are not prone to leaching or migrating as vapor to groundwater.

(2) Human health remediation goals listed are the chemical concentrations that are protective of all identified potentially exposed populations and potentially complete exposure pathways.

(3) Listed soil gas concentrations for VOCs and SVOCs are those calculated to be in equilibrium with the given soil concentrations for VOCs and SVOCs. Soil gas concentrations are listed only for those chemicals determined to be volatile.

Table 5

Screening Summary of General Response Actions, Technologies, and Process Options for Soil

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
No Action			No action.	Does not achieve remedial action objectives ("RAOs") for areas of concern ("AOCs") with chemicals of concern ("COCs") at concentrations in soil and groundwater that are above applicable remediation goals.	Easily implemented.	Negligible cost.	Retained. Required for consideration by National Oil and Hazardous Substances Pollution Contingency Plan ("NCP").
Institutional Controls			Institutional controls are included as components of all remedial alternatives evaluated in this Remedial Action Plan ("RAP"), with the exception of the no action alternative. Institutional controls will restrict the Site to commercial and industrial uses, prevent the use of groundwater, and obligate owners and tenants on the Site to implement the procedures specified in the Risk Management Plan ("RMP") and to update the information in the RMP as appropriate. The institutional controls also require the maintenance of existing cover or construction of new cover at the Site if the existing cover is removed.	Likely not to be effective as sole remedy. Anticipated to be effective as a component of selected remedial alternatives.	Easily implemented.	Low capital cost; low to moderate annual cost.	Retained as a component of all remedial alternatives except the no action alternative.
Containment			Containment refers to the use of capping technologies or engineered cover systems to minimize contact of wastes and COCs in soil by humans and ecological receptors. Cover systems also may be designed to restrict the infiltration of surface water or be used as a barrier against vapor intrusion.	Permeable covers are adequate to prevent direct contact with COCs and to restrict surface water infiltration at the Site. Low-permeability covers may be used in combination with soil vapor extraction ("SVE") or sub-slab depressurization ("SSD") systems to mitigate the vapor intrusion pathway.	Permeable cover systems are easily implemented. Low-permeability covers can be easily implemented during building construction, but are difficult to implement on existing buildings.	Low to moderate capital cost; low annual cost for both permeable and low-permeability cover systems.	Permeable covers are included as elements of the RMP. Low-permeability covers are included as potential elements of the RMP.
Monitoring			Monitoring refers to any number of activities used to serve as an evaluation tool or data gathering activity to demonstrate the effectiveness of the selected remedies over time.	Monitoring is effective for assessing the effectiveness of other remedial alternatives, but is not considered a remedial alternative alone.	Monitoring of soil vapor and groundwater has been ongoing at the Site and is easily implemented.	Low to moderate capital cost for installation of monitoring wells; moderate annual costs for routine monitoring.	Retained for consideration as a component of remedial alternatives and as an element of the RMP.

Table 5

Screening Summary of General Response Actions, Technologies, and Process Options for Soil

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
In-situ Soil Treatment	Physical/Chemical Technology	Soil Flushing	Water, surfactant, or organic solvents are injected into soil to remove COCs. Technology requires extraction system to recover and properly treat and/or dispose of fluid used to flush soil.	Not demonstrated for full-scale application.	Complete recovery of the solution used to wash soil can be extremely difficult.	Moderate to high capital cost; moderate annual cost.	Not retained. Not demonstrated. Fluid recovery difficult to accomplish.
		Immobilization	Cement or other chemical agents are injected and mixed with soil to immobilize COCs. Includes stabilization and solidification technologies.	Identified by U.S. Environmental Protection Agency ("U.S. EPA") as a preferred technology or "presumptive remedy" for treatment of soil with metals that pose a principal threat.	Uniform mixing of reagents can be difficult.	Moderate to high capital cost; negligible annual cost.	Not retained. Other more reliable and cost-effective technologies exist.
		Soil Vapor Extraction	Vacuum is applied to soil to remove volatile COCs for subsequent treatment in most applications.	Pilot systems in operation at the Site have proven effective at extracting substantial VOC mass from the subsurface and reducing VOC concentrations in soil vapor at Central Building P and Oil Staging Areas.	Easily implemented, as pilot systems are already in operation at the Site.	Moderate to high capital cost; moderate annual cost.	Retained. Effectiveness of technology has already been demonstrated at the Site.
		Sub-slab Depressurization	A slight vacuum is maintained beneath the building to overcome pressure gradient pulling volatile chemicals into the building.	Not intended to remediate contaminated soil. Effective at mitigating risk of vapor intrusion into buildings.	Easily implemented during building construction. Difficult to implement on existing buildings.	Moderate capital cost; moderate annual cost.	Retained as a potential element of the RMP.
		Electrokinetics	Conductive solution is injected into soil to mobilize COCs. Electrical current is applied across soil which metals in the soil to migrate to a cathode inserted in the subsurface. Technology requires extraction system to recover conductive solution injected into soil.	Not demonstrated. Technology in the development phase. Also, high permeability of soil at the Site make conditions unfavorable for application of electrokinetics.	Implementable.	High capital cost; high annual cost.	Not retained. Conditions at the Site are unsuitable for effective application of electrokinetics.
	Thermal Technology	Vitrification	Heat or electric current is applied to melt soil and incorporate metals into vitrified mass.	Soil at the Site may less suitable for this treatment due to the presence of gravel and cobbles in the subsurface.	Implementation may be limited by availability of necessary equipment.	High capital cost; negligible annual cost.	Not retained. Necessary equipment may not be available, and conditions at the Site are not well-suited to vitrification.
	Biological Technology	Phytoremediation	Plants established in impacted soil uptake COCs and incorporate the chemicals into their plant structure. Plants are subsequently harvested for disposal at an off-site, permitted waste management facility, if needed.	Not demonstrated. Also, lead, which is present in shallow soil at the Site, is difficult for plants to uptake.	Plants not compatible with planned commercial/industrial land use.	Low to moderate capital cost; low to moderate annual cost.	Not retained Not demonstrated and not compatible with planned industrial/commercial land use.
		Bioremediation	Oxygen, water, and/or nutrients are supplied in-situ to soil to stimulate indigenous microorganisms to degrade petroleum hydrocarbons or other organic chemicals under aerobic conditions and some chlorinated organic solvents under anaerobic conditions.	Aerobic conditions at the Site are generally effective for degradation of petroleum hydrocarbons, but rate of degradation likely limited by presence of free hydrocarbon product ("FHP").	Would likely require continued collection of FHP.	Moderate capital cost; low to moderate annual cost.	Not retained. Not suitable as primary means of treating tetrachloroethene ("PCE") or FHP in soil at the Site.

Table 5
Screening Summary of General Response Actions, Technologies, and Process Options for Soil
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
Soil Excavation			Soil is removed using standard construction techniques.	Complete removal of soil is likely to achieve applicable soil remediation goals.	Readily implemented with standard construction equipment.	Moderate to high capital cost, depending on the volume of soil to be excavated; negligible annual cost.	Retained.

Table 5
Screening Summary of General Response Actions, Technologies, and Process Options for Soil
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
Ex-situ Soil Treatment	Physical/Chemical Technology	Soil Washing	Water, surfactant, or organic solvents are used to leach COCs from soil.	Presumptive remedy for soil with metals that pose a principal threat.	Difficult to formulate a suitable wash solution for soil containing both metals and organic chemicals.	Moderate to high capital cost; moderate annual cost.	Not retained. Difficult to implement for complex waste mixtures.
		Chemical Oxidation/ Reduction	Chemicals are mixed with soil to oxidize or reduce COCs to less toxic forms.	Current full-scale applications are only appropriate for treatment of polychlorinated biphenyls ("PCBs"). No PCB-impacted soil has been identified at the Site.	Implementable.	Moderate to high capital cost; moderate annual cost.	Not retained. Not demonstrated for COCs at the Site.
		Immobilization	Soil is screened to remove oversize wastes and debris. Cement or other chemical reagents are mixed with soil to solidify or stabilize COCs.	Most appropriate and effective for metals-containing soils.	Implementation is a function of accessibility to soils. Can be performed as in-drum, in-plant, or area mixing.	Moderate to high capital cost; negligible annual cost.	Not retained. Easier to implement and less costly at an off-Site facility if needed to meet federal land disposal restrictions.
	Thermal Technology	Thermal Desorption	Soil is heated to volatilize COCs for subsequent treatment in most applications.	Likely to increase rate of removal of volatile and semi-volatile COCs.	Likely requires treatment of off-gas by incineration or adsorption.	Moderate to high capital cost; moderate to high annual cost.	Not retained. More cost effective alternatives available.
		Vitrification	Heat or electric current is applied to melt soil and to incorporate metals into vitrified mass.	Likely to destroy or remove organic chemicals and immobilize most inorganics.	Implementation may be limited by availability of necessary equipment.	High capital cost; moderate annual cost.	Not retained. Cost and availability of equipment limit implementation. More cost effective alternatives available.
		Incineration	Soil is burned at high temperatures, destroying organic compounds. Metals volatilize or remain in ash.	Would result in the destruction of organic compounds. Metals would either volatilize or remain in ash.	Approval extremely difficult to obtain for on-Site incineration.	Extremely high capital cost, negligible annual cost.	Not retained. Approval extremely difficult to obtain for on-Site incineration.
	Biological Technology	Phytoremediation	Plants established in soil uptake COCs and incorporate the chemicals in their plant structure. Plants are subsequently harvested for disposal at an off-site, permitted waste management facility.	Not yet demonstrated.	Implementation requires extended time and area to treat soil. May limit redevelopment of areas used for treatment.	Low to moderate to capital cost; low to moderate annual cost.	Not retained. Plants not compatible with planned industrial/commercial land use.
		Bioremediation	Oxygen, water, and/or nutrients are supplied ex-situ to soil to stimulate microbial degradation of petroleum hydrocarbons or other organic chemicals under aerobic conditions and some chlorinated organic solvents under anaerobic conditions.	Possible to reduce concentrations of petroleum hydrocarbons in soil by bioremediation.	Implementation requires extended time and area to treat soil. May limit redevelopment of areas used for treatment.	Moderate capital cost, moderate annual cost.	Not retained. Implementation limited by large volume of soil to be treated.

Table 5
Screening Summary of General Response Actions, Technologies, and Process Options for Soil
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
Excavated Soil Management	Reuse of Soil On-Site		Soil is treated such that COCs are below Site-specific remedial goals. Soil is reused on-Site.	Effective method of soil management if opportunities exist.	Readily implemented with standard construction equipment.	Low to moderate capital cost depending on the volume of soil to be managed; negligible annual cost.	Retained as a potential element of the RMP.
	Disposal of Soil Off-Site		Soil containing COCs is transported to and disposed at an off-Site, permitted waste management facility.	Complete removal of soil containing COCs from the Site is likely to achieve applicable remedial goals for soil.	Readily implemented with standard construction equipment.	Moderate to high capital cost depending on the volume of soil to be managed and the concentrations of COCs found in the soil; negligible annual cost.	Retained.

Table 6

Screening Summary of General Response Actions, Technologies, and Process Options for Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
No Action			No Action.	Does not achieve remedial action objectives for sites with chemicals of concern ("COCs") in soil and groundwater above applicable remedial goals.	Easily implemented.	Negligible cost.	Retained. Required for consideration by NCP.
Institutional Controls			Institutional controls are included as components of all remedial alternatives evaluated in this Remedial Action Plan ("RAP"), with the exception of the no action alternative. Institutional controls will restrict the Site to commercial and industrial uses, prevent the use of groundwater, and obligate owners and tenants on the Site to implement the procedures specified in the Risk Management Plan ("RMP") and to update the information in the RMP as appropriate. The institutional controls also require the maintenance of existing cover or construction of new cover at the Site if the existing cover is removed.	Likely not to be effective as sole remedy. Anticipated to be effective as a component of selected remedial alternatives.	Easily implemented.	Low capital cost; low to moderate annual cost.	Retained as a component of all remedial alternatives except the no action alternative.
Monitoring			Routine inspections alone or in conjunction with ongoing groundwater sampling are performed to assess environmental conditions at the Site and to enforce groundwater restrictions.	Monitored natural attenuation can be effective as a remedial alternative at locations where it is capable of achieving remedial action objectives ("RAOs") within a time frame that is reasonable compared to other alternatives.	Groundwater monitoring has been ongoing at the Site and is easily implemented.	Low to moderate capital cost for installation of monitoring wells; moderate annual costs for routine monitoring.	Retained for consideration as a component of remedial alternatives and as an element of the RMP.
Groundwater Diversion	Subsurface Barriers	Slurry Wall	Slurry walls or grout curtains are created by injecting or placing a soil-bentonite or cement-bentonite mixture into the subsurface. Slurry walls are used to divert groundwater flow.	Slurry wall is likely to divert groundwater flow but does not lessen toxicity or volume of COCs.	Requires a low permeability layer into which a slurry wall can be keyed. Such a layer does not exist at depths shallower than 90 feet below ground surface ("ft bgs").	Moderate to high capital cost; low annual cost.	Not retained. Not implementable at the Site.
		Sheet Piling	Low permeability vertical barrier created by vibrating or otherwise installing sheet piling into the subsurface. Sheet piling is used to divert groundwater flow.	Sheet piling is likely to divert groundwater flow but does not lessen toxicity or volume of COCs.	Difficult to implement beyond 40 ft bgs. Groundwater at the Site is found at 50 ft bgs or more.	Moderate to high capital cost; low annual cost.	Not retained. Depth to groundwater at Site makes application unsuitable.

Table 6
Screening Summary of General Response Actions, Technologies, and Process Options for Groundwater
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
In-situ Groundwater Treatment	Physical/Chemical Technology	Air Sparging	Air sparging, recirculating wells, or other means cause volatile chemicals of concern ("COCs") in groundwater to partition into an air stream that is collected through soil vapor extraction for subsequent treatment in most applications.	Could volatize VOCs found in groundwater.	Treatment of off-gas may be necessary, but soil vapor extraction ("SVE") systems operating at the Site are capable of treating the air stream.	Moderate to high capital cost; low to moderate annual cost.	Retained.
		Permeable Reactive Walls	Groundwater is directed into subsurface units or "walls" that contain zero-valent iron or other reactive medium that converts COCs to less toxic forms.	Emerging physical/chemical process. May be possible to reduce concentration of COCs if groundwater can be preferentially directed through the wall. High permeability of soil at the Site would make this difficult.	Wall may need to be replaced if scaling of the reactive medium occurs.	High capital cost; moderate to high annual cost.	Not retained. High permeability of soil makes groundwater flow through the wall more difficult to control.
		Chemical Oxidation/ Reduction	Chemicals are injected or otherwise introduced to groundwater to oxidize or reduce COCs to less toxic forms.	Emerging physical/chemical process.	Often difficult to deliver chemicals to the desired location and to ensure adequate distribution of chemicals.	Moderate to high capital cost, high annual cost if COC concentrations rebound making reapplication of chemicals necessary.	Not retained. More cost-effective and proven technologies exist.
	Biological Technology	Bioremediation	Enhanced bioremediation can be performed under both aerobic (i.e., presence of oxygen) and anaerobic (i.e., absence of oxygen) conditions. Under aerobic conditions, oxygen and nutrients are supplied in-situ to groundwater containing COCs to stimulate degradation of organic chemicals by indigenous microorganisms. Petroleum hydrocarbons and many other organic chemicals are amenable to aerobic bioremediation. Under anaerobic conditions, nutrients are supplied in-situ to groundwater containing COCs to stimulate degradation of organic chemicals by indigenous microorganisms. Some chlorinated organic solvents are amenable to anaerobic bioremediation.	Bioremediation of chlorinated organic solvents requires anaerobic conditions, which are not found in groundwater at the Site. Bioremediation of petroleum hydrocarbons under aerobic conditions is possible, but petroleum hydrocarbons are not found as dissolved constituents.	Implementation depends on ability to create necessary conditions for bioremediation and ability to deliver nutrients and/or oxygen to desired locations.	High capital cost, high annual cost if COC concentrations rebound making reapplication of chemicals necessary.	Not retained. Not appropriate as a primary treatment method for tetrachloroethene ("PCE") in groundwater or free hydrocarbon product ("FHP").

Table 6
Screening Summary of General Response Actions, Technologies, and Process Options for Groundwater
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
Groundwater Extraction	Wells		Migration of COCs in groundwater is controlled by extracting impacted groundwater. Groundwater is removed from the subsurface by mechanical pumps placed in vertical wells. It is also possible to collect free phase product from groundwater extraction wells.	Once hydraulic control has been established, effective in removing groundwater containing dissolved-phase COCs as well as free phase product.	Can be implemented with standard techniques. FHP is currently extracted from wells at the Building A area.	Moderate capital cost, moderate annual cost.	Retained.
	Trenches		Migration of COCs in groundwater is controlled by extracting impacted groundwater. Groundwater is collected as it flows into trenches. The water is pumped from sumps in the bottom of the trenches to the above grade collection point.	Normally used for extraction of shallow groundwater in soils with low permeability.	Not implementable at the Site because depth to groundwater is 50 ft or more.	High capital cost, moderate annual cost.	Not retained. Depth to groundwater at Site makes application unsuitable.

Table 6
Screening Summary of General Response Actions, Technologies, and Process Options for Groundwater
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
Ex-situ Groundwater Treatment	Physical/Chemical Technologies	Air Stripping	Air stripping causes volatile COCs to partition from water to an air stream. Subsequent treatment of air stream may be required.	Presumptive remedy for treatment of VOCs in groundwater.	Can be implemented with standard equipment.	Moderate to high capital cost; moderate annual cost.	Retained.
		Adsorption	COCs in liquid or vapor phase are adsorbed onto granular activated carbon ("GAC") or resin beds. Vacuum is applied to treat vapor streams.	GAC adsorption is a presumptive remedy for treatment of VOCs in groundwater.	Can be implemented with standard equipment.	Moderate to high capital cost; moderate annual cost.	Retained.
		Membrane Separation	Reverse osmosis, ultrafiltration, or electrodialysis employ membranes to separate COCs from water. Filter cake and or concentrated fluid waste ("brine") require subsequent treatment and disposal.	Presumptive remedy for treatment of metals in groundwater, but metals have not substantially impacted groundwater at the Site.	Can be implemented with commercially available equipment.	High capital cost; moderate to high annual cost.	Not retained. Treatment of groundwater for metals is not anticipated.
		Precipitation/Coagulation	Chemicals are supplied to water to convert COCs to insoluble forms which are then filtered, settled, or otherwise removed from water.	Presumptive remedy for treatment of metals in groundwater, but metals have not substantially impacted groundwater at the Site.	Can be implemented with commercially available equipment.	Moderate to high capital cost; moderate to high annual cost.	Not retained. Treatment of groundwater for metals is not anticipated.
		Ion Exchange	Chemical treatment by ion exchange captures ionic COCs on a resin bed.	Presumptive remedy for treatment of metals in groundwater, but metals have not substantially impacted groundwater at the Site.	Can be implemented with commercially available equipment.	Moderate to high capital cost, moderate to high annual cost.	Not retained. Treatment of groundwater for metals is not anticipated.
		Advanced Oxidation	Ultraviolet light, hydrogen peroxide, or ozone alone or in combination are supplied to water to destroy or convert COCs to less toxic forms.	Presumptive remedy for treatment of organic compounds in groundwater.	Implementable.	Moderate to high capital cost, moderate to high annual cost.	Retained.
	Biological Technologies	Bioremediation	Oxygen, water, and/or nutrients are supplied ex-situ to groundwater to stimulate microbial degradation of petroleum hydrocarbons or other organic chemicals under aerobic conditions and some chlorinated organic solvents under anaerobic conditions.	Would require a complicated treatment process to induce conditions necessary for effective treatment of PCE found in groundwater at the Site.	Difficult to implement.	Moderate to high capital cost, moderate to high annual cost.	Not retained. Difficult to implement due to necessary groundwater conditions.

Table 6
Screening Summary of General Response Actions, Technologies, and Process Options for Groundwater
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

General Response Action	Remedial Technology	Process Option	Description	Effectiveness	Implementability	Cost	Status
Extracted Groundwater Management	Reclamation		Reuse water for irrigation, pond, or other use on site.	Effective use of water if treated to acceptable levels and opportunities exist.	No reuse opportunities exist at the Site.	Moderate capital cost; low to moderate annual cost.	Not retained. No reuse opportunities exist at the Site.
	Discharge to Sanitary Sewer		Discharge of collected water to City of Los Angeles Publicly Owned Treatment Works ("POTW") under permit.	Effective method of water disposal.	Readily implemented after receiving a permit from the POTW. POTW prohibits discharge to the sanitary sewer if discharge to the storm drain is not permitted.	Low to moderate capital cost depending on the permitting process. Low to moderate annual cost depending on the discharge rate.	Not retained because discharge to a storm drain is an option.
	Discharge to Storm Drain		Discharge of collected water to surface water under National Pollutant Discharge Elimination System ("NPDES") permit.	Effective method of water disposal.	Readily implemented after receiving a NPDES permit and demonstrating that other options are technically or economically infeasible.	Low to moderate capital cost depending on the permitting process, low annual cost.	Retained.
	Disposal at Off-Site Permitted Facility		Disposal of collected fluid waste to offsite permitted facility under agreement.	Effective method of fluid waste disposal.	Readily implemented. FHP collected from wells at the Building A Area is disposed at an off-Site, permitted facility.	Cost effective if quantities of extracted groundwater are small, or the recovered water is highly contaminated or contains immiscible liquids.	Retained.

Table 7

Detailed Analysis of Remedial Alternative: No Action for Soil and Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment where no chemicals of concern ("COCs") are present above soil remediation goals. No institutional controls are included in this alternative.
	• Compliance with ARARs	ARARs require institutional controls to meet unrestricted land use. No institutional controls are included.
Balancing Criteria	• Long-term Effectiveness and Permanence	This alternative may offer long-term protection against exposure of humans and ecological receptors if no COCs are present above soil remediation goals.
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will not reduce toxicity, mobility, or volume of COCs.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community.
	• Implementability	Readily implemented.
	• Cost	Negligible costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, is not anticipated to accept alternative at any site without institutional controls.
	• Community Acceptance	Community members are not anticipated to accept this alternative at any site without institutional controls.
• State of California Health and Safety Code Criteria		Alternative does not comply with State of California Health and Safety Code Criteria.
• Summary of Evaluation Criteria		Alternative is not selected at any location at the Site. The no action alternative is included to comply with NCP requirements and to provide a baseline for evaluating other remedial alternatives.

Table 8

Detailed Analysis of Remedial Alternative: Excavate Soil and Dispose Off-Site and No Action for Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Evaluation Criteria		Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment at locations where chemicals of concern ("COCs") in soil exceed remediation goals, impacted soils can be removed, and no groundwater remedial action is necessary.
	• Compliance with ARARs	This alternative is expected to comply with ARARs at sites where soil with COC concentrations above remediation goals has been identified, but no groundwater remedial action is required.
Balancing Criteria	• Long-term Effectiveness and Permanence	This alternative offers long-term effectiveness and permanence because impacted soil is removed from the site.
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will reduce mobility and volume of COCs in the subsurface by removal of contaminated soil.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community after soil removal activities.
	• Implementability	This alternative is implementable with standard excavation techniques.
	• Cost	This alternative has moderate to high capital cost, depending on the volume of soil to be excavated, and no annual costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, may accept this alternative if it is protective of human health and the environment and complies with ARARs.
	• Community Acceptance	Community members may accept this alternative if it is protective of human health and the environment and complies with ARARs.
• State of California Health and Safety Code Criteria		This alternative may comply with State of California Health and Safety Code Criteria.
• Summary of Evaluation Criteria		This alternative may be selected for locations where COC concentrations in soil exceed remediation goals and are concentrated in an identifiable area, such that excavation removes a significant volume of COCs, and no groundwater remedial action is required.

Table 9

Detailed Analysis of Remedial Alternative: Perform Soil Vapor Extraction ("SVE") in Soil, and Monitor Natural Attenuation of Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment at locations where volatile chemicals of concern ("COCs") in soil exceed soil remediation goals and groundwater impacts are limited, such that COC concentrations in groundwater will reach levels comparable to those migrating on-Site in a reasonable amount of time.
	• Compliance with ARARs	This alternative is expected to comply with ARARs at locations where soil with volatile COC concentrations above remediation goals has been identified, and groundwater impacts are limited.
Balancing Criteria	• Long-term Effectiveness and Permanence	This alternative offers long-term effectiveness and permanence because volatile COCs are removed from the soil.
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will reduce toxicity and volume of COCs in the subsurface by collection and removal of soil vapor. In addition, mobility of these vapors into any overlying buildings will be reduced.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community. Pilot testing of SVE systems at the Site indicated that removal of chemical mass begins shortly after startup of the system.
	• Implementability	This alternative is readily implemented, as two pilot soil vapor extraction systems are currently operating at the Site, and routine groundwater monitoring is conducted on a quarterly basis.
	• Cost	Alternative has moderate capital costs, and moderate annual costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, may accept this alternative if it is protective of human health and the environment and complies with ARARs.
	• Community Acceptance	Community members may accept this alternative if it is protective of human health and the environment and complies with ARARs.
• State of California Health and Safety Code Criteria		Alternative may comply with State of California Health and Safety Code Criteria.
• Summary of Evaluation Criteria		Alternative may be selected for locations where volatile COC concentrations in soil exceed soil remediation goals, and groundwater impacts are limited. Soil vapor and groundwater monitoring are included to monitor COC concentrations and effectiveness of remedial actions.

Table 10

Detailed Analysis of Remedial Alternative: Perform Soil Vapor Extraction ("SVE") in Soil, and Conduct In-Situ Air Sparging in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment at locations where volatile chemicals of concern ("COCs") in soil exceed soil remediation goals, and groundwater impacts by volatile COCs are present.
	• Compliance with ARARs	This alternative is expected to comply with ARARs at sites where soil with volatile COC concentrations above soil remediation goals has been identified, and groundwater remedial action is necessary.
Balancing Criteria	• Long-term Effectiveness and Permanence Permanence	This alternative offers long-term effectiveness and permanence because volatile COCs are removed from both the soil and groundwater
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will reduce toxicity and volume of COCs in the subsurface by collection and removal of soil vapor. In addition, mobility of these vapors into overlying buildings will be reduced.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community. Pilot testing of SVE systems at the Site indicated that removal of chemical mass begins shortly after startup of the system.
	• Implementability	This alternative is readily implemented. Two pilot SVE systems are currently operating at the Site.
	• Cost	This alternative has moderate to high capital cost, and moderate annual costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, may accept this alternative if it is protective of human health and the environment and complies with ARARs.
	• Community Acceptance	Community members may accept this alternative if it is protective of human health and the environment and complies with ARARs.
• State of California Health and Safety Code Criteria		This alternative may comply with State of California Health and Safety Code Criteria.
• Summary of Evaluation Criteria		Alternative may be selected for locations where volatile COC concentrations in soil exceed remediation goals, and groundwater impacts by volatile COCs have been identified. Groundwater and soil vapor monitoring are included to monitor COC concentrations and effectiveness of remedial actions.

Table 11

Detailed Analysis of Remedial Alternative: Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment at locations where chemicals of concern ("COCs") in soil exceed remediation goals, impacted soils can be removed, groundwater impacts are present, and groundwater treatment technologies effectively treat residual COCs.
	• Compliance with ARARs	This alternative is expected to comply with ARARs at locations where soil with COC concentrations above remediation goals has been identified, and groundwater remedial action is necessary.
Balancing Criteria	• Long-term Effectiveness and Permanence	This alternative offers long-term effectiveness and permanence because impacted soil is removed from the site.
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will reduce toxicity, mobility, and volume of COCs in the subsurface by a combination of removal of soil and removal and treatment of groundwater.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community, after minor soil removal activities. Treatment of entire area of impacted groundwater may not be immediate.
	• Implementability	This alternative is implementable with standard excavation techniques and groundwater extraction and treatment procedures.
	• Cost	This alternative has moderate to high capital cost, and moderate annual costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, may accept this alternative if it is protective of human health and the environment and complies with ARARs.
	• Community Acceptance	Community members may accept this alternative if it is protective of human health and the environment and complies with ARARs.
• State of California Health and Safety Code Criteria		Alternative may comply with State of California Health and Safety Code Criteria.
• Summary of Evaluation Criteria		Alternative may be selected for locations where COC concentrations in soil are elevated and concentrated in an identifiable area, such that excavation removes a significant volume of COCs, and groundwater extraction and treatment could address residual COC concentrations in groundwater. Groundwater monitoring is included to monitor COC concentrations and effectiveness of remedial actions.

Table 12

Detailed Analysis of Remedial Alternative: Excavate Subsurface Structures and Dispose Off-Site, Perform Soil Vapor Extraction ("SVE") in Soil, and Conduct In-Situ Air Sparging ("IAS") in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment if chemicals of concern ("COCs") in soil exceed remediation goals, some impacted soils can be removed, and residual COCs in soil and groundwater are volatile such that the chosen treatment technologies will be effective.
	• Compliance with ARARs	This alternative is expected to comply with ARARs at locations where soil with COC concentrations above soil remediation goals has been identified, and groundwater remedial action is required.
Balancing Criteria	• Long-term Effectiveness and Permanence	This alternative offers long-term effectiveness and permanence because some impacted soil is removed from the site, and volatile COCs are extracted as soil vapor.
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will reduce toxicity, mobility, and volume of COCs in the subsurface by a combination of permanent removal of soil and extraction and of volatile COCs in soil vapor. In addition, mobility of these vapors into overlying buildings will be reduced.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community, after minor soil removal activities. Pilot testing of SVE systems at the Site indicated that removal of chemical mass begins shortly after startup of the system
	• Implementability	This alternative is implementable with standard excavation techniques, an SVE system similar to the pilot systems currently operating at the Site, and standard IAS techniques.
	• Cost	This alternative has moderate to high capital costs, and moderate annual costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, may accept this alternative if it is protective of human health and the environment and complies with ARARs.
	• Community Acceptance	Community members may accept this alternative if it is protective of human health and the environment and complies with ARARs.
• State of California Health and Safety Code Criteria		This alternative may comply with State of California Health and Safety Code Criteria.

Table 12

Detailed Analysis of Remedial Alternative: Excavate Subsurface Structures and Dispose Off-Site, Perform Soil Vapor Extraction ("SVE") in Soil, and Conduct In-Situ Air Sparging ("IAS") in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
• Summary of Evaluation Criteria	This alternative may be selected for locations where COC concentrations in soil and groundwater are elevated and concentrated in an identifiable area, such that excavation removes a significant volume of COCs. Residual COCs in soil and groundwater should be volatile and treatable by SVE and IAS. Soil vapor and groundwater monitoring are included to monitor COC concentrations and effectiveness of remedial actions.

Table 13

Detailed Analysis of Remedial Alternative: Excavate Subsurface Structures and Dispose Off-Site, Perform Soil Vapor Extraction ("SVE") in Soil, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment if chemicals of concern ("COCs") in soil exceed soil remediation goals, some impacted soils can be removed, residual COCs are volatile, groundwater impacts have been identified, and groundwater treatment technologies will effectively treat residual COCs.
	• Compliance with ARARs	This alternative is expected to comply with ARARs at sites where soil with COC concentrations above remediation goals has been identified and groundwater remedial action is necssary.
Balancing Criteria	• Long-term Effectiveness and Permanence	This alternative offers long-term effectiveness and permanence because impacted soil is removed from the Site, and volatile COCs are removeded from both soil vapor and groundwater.
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will reduce toxicity, mobility, and volume of COCs in the subsurface by a combination of permanent removal of soil and removal of COCs from both soil vapor and groundwater. Mobility of vapors into overlying buildings will also be reduced,.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community, after minor soil removal activities. Treatment of entire area of impacted groundwater may not accomplished immediately.
	• Implementability	This alternative is implementable with standard excavation techniques, a soil vapor extraction ("SVE") system similar to the pilot systems currently operating at the Site, and standard groundwater extraction and treatment procedures.
	• Cost	This alternative has high capital costs, and high annual costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, may accept this alternative if it is protective of human health and the environment and complies with ARARs.
	• Community Acceptance	Community members may accept this alternative if it is protective of human health and the environment and complies with ARARs.
• State of California Health and Safety Code Criteria		This alternative may comply with State of California Health and Safety Code Criteria.

Table 13

Detailed Analysis of Remedial Alternative: Excavate Subsurface Structures and Dispose Off-Site, Perform Soil Vapor Extraction ("SVE") in Soil, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
• Summary of Evaluation Criteria	This alternative may be selected for locations where COC concentrations in soil exceed soil remediation goals and are concentrated in an identifiable area, such that excavation will remove a significant volume of COCs. Residual COCs in soil and groundwater should be treatable by SVE and groundwater extraction and treatment. Groundwater and soil vapor monitoring are included to monitor COC concentrations and effectiveness of remedial actions.

Table 14

Detailed Analysis of Remedial Alternative: Perform Complete Excavation and Dispose of Soil Off-Site, and Collect Free Hydrocarbon Product ("FHP") from Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment if chemicals of concern ("COCs") in soil exceed soil remediation goals, and FHP has been found in groundwater, with little other impact to groundwater.
	• Compliance with ARARs	This alternative is expected to comply with ARARs at locations where soil with COC concentrations above soil remediation goals has been identified, and groundwater remedial action is necessary.
Balancing Criteria	• Long-term Effectiveness and Permanence	This alternative offers long-term effectiveness and permanence because both impacted soil and FHP are removed from the Site.
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will reduce mobility and volume of COCs in the subsurface by a combination of removal of soil and removal of FHP. Additionally, removal of FHP also removes any contaminants that preferentially partition into the product from groundwater.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community, after soil removal activities.
	• Implementability	This alternative is implementable with standard excavation techniques and an FHP collection system similar to that which has operated at the Site for several years.
	• Cost	This alternative has high capital cost, and moderate annual costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, may accept this alternative if it is protective of human health and the environment and complies with ARARs.
	• Community Acceptance	Community members may accept this alternative if it is protective of human health and the environment and complies with ARARs.
• State of California Health and Safety Code Criteria		This alternative may comply with State of California Health and Safety Code Criteria.
• Summary of Evaluation Criteria		This alternative may be selected for locations where COC concentrations in soil exceed soil remediation goals, and FHP is found on the water table.

Table 15

Detailed Analysis of Remedial Alternative: Perform Limited Excavation and Dispose of Soil Off-Site, and Collect Free Hydrocarbon Product ("FHP") from Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Evaluation Criteria		Conditions Under Which Alternative May Be Applicable
Threshold Criteria	• Overall Protection of Human Health and the Environment	This alternative may be protective of human health and the environment if chemicals of concern ("COCs") in soil exceed soil remediation goals, and FHP has been found on groundwater, with little other impact to groundwater.
	• Compliance with ARARs	This alternative is expected to comply with ARARs at locations where soil with COC concentrations above soil remediation goals has been identified, and groundwater remedial action is necessary.
Balancing Criteria	• Long-term Effectiveness and Permanence	This alternative offers long-term effectiveness and permanence because both impacted soil and FHP are removed from the Site.
	• Reduction of Toxicity, Mobility, or Volume through Treatment	This alternative will reduce mobility and volume of COCs in the subsurface by a combination of removal of soil and removal of FHP. Additionally, removal of FHP also removes any contaminants that preferentially partion into the product from the groundwater.
	• Short-term Effectiveness	This alternative is not anticipated to result in any short-term disruptions or risks to workers and the community, after soil removal activities.
	• Implementability	This alternative is implementable with standard excavation techniques and an FHP collection system similar to that which has operated at the Site for several years.
	• Cost	This alternative has moderate capital cost, and moderate annual costs.
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region, may accept this alternative if it is protective of human health and the environment and complies with ARARs.
	• Community Acceptance	Community members may accept this alternative if it is protective of human health and the environment and complies with ARARs.
• State of California Health and Safety Code Criteria		This alternative may comply with State of California Health and Safety Code Criteria.
• Summary of Evaluation Criteria		This alternative may be selected for locations where COC concentrations in soil exceed soil remediation goals and FHP is found on the water table.

Table 16

Comparative Analysis of Remedial Alternatives: Central Building P Area

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Alternative 1 No Action for Soil and Groundwater	Alternative 2 Perform Soil Vapor Extraction ("SVE") in Soil, and Monitor Natural Attenuation in Groundwater	Alternative 3 Perform SVE in Soil, and Conduct In-Situ Air Sparging ("IAS") in Groundwater	Alternative 4 Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater	Alternative 5 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater	Alternative 6 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater
Threshold Criteria	• Overall Protection of Human Health and the Environment	Alternative is not anticipated to be protective of human health or the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.
Threshold Criteria	• Compliance with ARARs	Alternative is not anticipated to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.
Balancing Criteria	• Long-term Effectiveness and Permanence	Alternative will not offer long-term protection against exposure of humans and ecological receptors to chemicals of concern ("COCs") in soil or groundwater.	Alternative will offer long-term effectiveness as volatile COCs will be extracted as vapor and treated.	Alternative will offer long-term effectiveness as volatile COCs will be extracted as vapor and treated.	Alternative will offer long-term effectiveness as impacted soil will be removed, and COCs will be extracted from groundwater and treated.	Alternative will offer long-term effectiveness as some impacted soil will be removed, and volatile COCs will be extracted as vapor and treated.	Alternative will offer long-term effectiveness as some impacted soil will be removed, and COCs will be removed both as vapor and from the groundwater and treated.
Balancing Criteria	• Reduction of Toxicity, Mobility, or Volume through Treatment	Alternative will not reduce toxicity, mobility, or volume of COCs.	Volume and toxicity of COCs will be reduced by extraction and treatment of vapors. Alternative will also reduce mobility of vapors into overlying buildings.	Volume and toxicity of COCs will be reduced by extraction and treatment of vapors. Alternative will also reduce mobility of these vapors into overlying buildings.	Alternative may reduce mobility and volume of COCs by removal of impacted soil. Groundwater extraction and treatment may also reduce volume and toxicity of COCs.	Alternative will reduce mobility and toxicity of COCs by removal of some impacted soil. Volume and toxicity of COCs will also be reduced by extraction and treatment of vapors. Alternative will also reduce mobility of these vapors into overlying buildings.	Alternative may reduce mobility and volume of COCs by removal of some impacted soil. Volume and toxicity of COCs will also be reduced by extraction and treatment of soil vapor and groundwater.
Balancing Criteria	• Short-term Effectiveness	Alternative is not anticipated to result in any short-term disruptions or risks to workers and the community.	Alternative is not anticipated to result in any short-term disruptions or risks. Since no active remedial action is taken for groundwater, short-term effiectiveness is limited.	Alternative is not anticipated to result in any short-term disruptions or risks.	Alternative is not anticipated to result in any short-term disruptions or risks. Treatment of entire area of impacted groundwater cannot be accomplished immediately.	Alternative is not anticipated to result in any short-term disruptions or risks.	Alternative is not anticipated to result in any short-term disruptions or risks. Treatment of entire area of impacted groundwater cannot be accomplished immediately.

Table 16

Comparative Analysis of Remedial Alternatives: Central Building P Area

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Alternative 1 No Action for Soil and Groundwater	Alternative 2 Perform Soil Vapor Extraction ("SVE") in Soil, and Monitor Natural Attenuation in Groundwater	Alternative 3 Perform SVE in Soil, and Conduct In-Situ Air Sparging ("IAS") in Groundwater	Alternative 4 Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater	Alternative 5 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater	Alternative 6 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater
Balancing Criteria	• Implementability	Alternative can be easily implemented.	Alternative can be implemented, as two pilot SVE systems are currently operating at the Site, and routine groundwater monitoring is performed on a quarterly basis.	Alternative can be implemented, with an SVE system similar to those currently operating at the Site, and standard air sparging procedures.	Alternative can be implemented, as it involves standard excavation and groundwater extraction and treatment procedures.	Alternative can be implemented, as it involves standard excavation techniques, an SVE system similar to those currently operating at the Site, and standard air sparging procedures.	Alternative can be implemented, as it involves standard excavation techniques, an SVE system similar to those currently operating at the Site, and standard groundwater extraction and treatment procedures.
	• Cost (1) Total Estimated Capital Cost Total Estimated Annual Cost TOTAL:	Alternative has negligible costs associated with implementation.	$95,000 $250,000 $350,000	$169,000 $110,000 $280,000	$560,000 $50,000 $610,000	$232,000 $110,000 $340,000	$221,000 $120,000 $300,000
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region ("RWQCB") is not anticipated to accept alternative.	It is expected that RWQCB may consider this alternative to be acceptable.	It is expected that RWQCB may consider this alternative to be acceptable.	It is expected that RWQCB may consider this alternative to be acceptable.	It is expected that RWQCB will consider this alternative to be acceptable.	It is expected that RWQCB may consider this alternative to be acceptable.
	• Community Acceptance	Alternative is not anticipated to be accepted by community members.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.
•	Six Factors from State of California Health and Safety Code Section 25356.1	Alternative does not comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.
•	Summary of Evaluation Criteria	**Alternative is Not Selected.** Alternative is not protective of human health and the environment, and does not comply with ARARs.	**Alternative is Not Selected.** Without any active remedial action in groundwater, alternative is not as effective as other options in the short-term. Additionally, this alternative does not address petroleum-impacted soil found near the former clarifier.	**Alternative is Not Selected.** This alternative does not address petroleum-impacted soil found near the clarifier.	**Alternative is Not Selected.** This alternative is not as cost-effective as other options. Also, groundwater extraction and treatment may not be as effective in the short term.	**Selected Alternative.** Alternative will reduce the volume, toxicity, and mobility of COCs in soil, soil gas, and groundwater. It is protective of human health and the environment and complies with ARARs.	**Alternative is Not Selected.** Groundwater extraction and treatment will not be as effective as air sparging in the short term, as it will likely take longer to establish a zone of capture.

Notes

(1) See Appendix D for the calculation of the capital and annual costs of each alternative.

Table 17

Comparative Analysis of Remedial Alternatives: Building A Area

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Alternative 1 No Action for Soil and Groundwater	Alternative 2 Perform Complete Excavation of Soil and Dispose Off-Site, and Collect Free Hydrocarbon Product ("FHP") from Groundwater	Alternative 3 Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP from Groundwater
Threshold Criteria	• Overall Protection of Human Health and the Environment	Alternative is not anticipated to be protective of human health or the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.
	• Compliance with ARARs	Alternative is not anticipated to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.
Balancing Criteria	• Long-term Effectiveness and Permanence	Alternative will not offer long-term protection against exposure of humans and ecological receptors to chemicals of concern ("COCs") in soil or groundwater.	Alternative will offer long-term effectiveness as impacted soil and FHP will be removed from the Site	Alternative will offer long-term effectiveness as impacted soil and FHP will be removed from the Site
	• Reduction of Toxicity, Mobility or Volume through Treatment	Alternative will not reduce toxicity, mobility, or volume of COCs.	Alternative will reduce volume of COCs in the subsurface by removal of impacted soil and FHP.	Alternative will reduce volume of COCs in the subsurface by removal of impacted soil and FHP.
	• Short-term Effectiveness	Alternative is not anticipated to result in any short-term disruptions or risks to workers and the community.	Alternative is not anticipated to result in any short-term disruptions or risks to workers and the community., other than soil removal activities.	Alternative is not anticipated to result in any short-term disruptions or risks to workers and the community., other than soil removal activities.
	• Implementability	Alternative can be easily implemented.	Alternative can be implemented, as it involves standard excavation techniques and an FHP collection system similar to one currently operating at the Site.	Alternative can be implemented, as it involves standard excavation techniques and an FHP collection system similar to one currently operating at the Site.
	• Cost (1) Total Estimated Capital Cost Total Estimated Annual Cost TOTAL:	Alternative has negligible costs associated with implementation.	 $6,100,000 $190,000 $6,300,000	 $230,000 $190,000 $420,000

Table 17

Comparative Analysis of Remedial Alternatives: Building A Area

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Evaluation Criteria		Alternative 1 No Action for Soil and Groundwater	Alternative 2 Perform Complete Excavation of Soil and Dispose Off-Site, and Collect Free Hydrocarbon Product ("FHP") from Groundwater	Alternative 3 Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP from Groundwater
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region ("RWQCB") is not anticipated to accept this alternative.	It is expected that RWQCB will consider this alternative to be acceptable.	It is expected that RWQCB will consider this alternative to be acceptable.
Modifying Criteria	• Community Acceptance	Alternative is not anticipated to be accepted by community members.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.
• Six Factors from State of California Health and Safety Code Section 25356.1		Alternative does not comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.
• Summary of Evaluation Criteria		**Alternative is Not Selected.** This alternative is not protective of human health and the environment, and does not comply with ARARs.	**Alternative is Not Selected.** Although this alternative is protective of human health and the environment, the cost associated with excavation and disposal of the large volume of soil is exorbitant.	**Selected Alternative.** This alternative is protective of human health and the environment and complies with ARARs.

Notes

(1) See Appendix D for the calculation of the capital and annual costs of each alternative.

Table 18

Comparative Analysis of Remedial Alternatives: Oil Staging Area

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Alternative 1 No Action for Soil and Groundwater	Alternative 2 Perform Soil Vapor Extraction ("SVE") in Soil, and Monitor Natural Attenuation in Groundwater	Alternative 3 Perform SVE in Soil, and Conduct In-Situ Air Sparging ("IAS") in Groundwater	Alternative 4 Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater	Alternative 5 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater	Alternative 6 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater
Threshold Criteria	• Overall Protection of Human Health and the Environment	Alternative is not anticipated to be protective of human health or the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.	Alternative is expected to be protective of human health and the environment.
Threshold Criteria	• Compliance with ARARs	Alternative is not anticipated to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.	Alternative is expected to comply with ARARs.
Balancing Criteria	• Long-term Effectiveness and Permanence	Alternative will not offer long-term protection against exposure of humans and ecological receptors to chemicals of concern ("COCs") in soil or groundwater.	Alternative will offer long-term effectiveness as volatile COCs will be extracted as vapor and treated.	Alternative will offer long-term effectiveness as volatile COCs will be extracted as vapor and treated.	Alternative will offer long-term effectiveness as impacted soil will be removed, and COCs will be. extracted from groundwater and treated.	Alternative will offer long-term effectiveness as some impacted soil will be removed, and volatile COCs will be extracted as vapor and treated.	Alternative will offer long-term effectiveness as some impacted soil will be removed, and volatile COCs will be extracted as vapor and treated.
Balancing Criteria	• Reduction of Toxicity, Mobility, or Volume through Treatment	Alternative will not reduce toxicity, mobility, or volume of COCs.	Volume and toxicity of COCs will be reduced by extraction and treatment of vapors. Alternative will also reduce mobility of vapors into overlying buildings.	Volume and toxicity of COCs will be reduced by extraction and treatment of vapors. Alternative will also reduce mobility of these vapors into overlying buildings.	Alternative may reduce mobility and volume of COCs by removal of impacted soil. Groundwater extraction and treatment may also reduce volume and toxicity of COCs.	Alternative will reduce mobility and toxicity of COCs by removal of some impacted soil. Volume and toxicity of COCs will also be reduced by extraction and treatment of vapors. Alternative will also reduce mobility of these vapors into overlying buildings.	Alternative may reduce mobility and volume of COCs by removal of some impacted soil. Volume and toxicity of COCs will also be reduced by extraction and treatment of soil vapor and groundwater.
Balancing Criteria	• Short-term Effectiveness	Alternative is not anticipated to result in any short-term disruptions or risks to workers and the community.	Alternative is not anticipated to result in any short-term disruptions or risks. Since no active remedial action is taken for groundwater, short-term effiectiveness is limited.	Alternative is not anticipated to result in any short-term disruptions or risks.	Alternative is not anticipated to result in any short-term disruptions or risks. Treatment of entire area of impacted groundwater cannot be accomplished immediately.	Alternative is not anticipated to result in any short-term disruptions or risks.	Alternative is not anticipated to result in any short-term disruptions or risks. Treatment of entire area of impacted groundwater cannot be accomplished immediately.
Balancing Criteria	• Implementability	Alternative can be easily implemented.	Alternative can be implemented, as two pilot SVE systems are currently operating at the Site, and routine groundwater monitoring is performed on a quarterly basis.	Alternative can be implemented, with an SVE system similar to those currently operating at the Site, and standard air sparging procedures.	Alternative can be implemented, as it involves standard excavation and groundwater extraction and treatment procedures.	Alternative can be implemented, as it involves standard excavation techniques, an SVE system similar to those currently operating at the Site, and standard air sparging procedures.	Alternative can be implemented, as it involves standard excavation techniques, an SVE system similar to those currently operating at the Site, and standard groundwater extraction and treatment procedures.
Balancing Criteria	• Cost (1) Total Estimated Capital Cost Total Estimated Annual Cost TOTAL:	Alternative has negligible costs associated with implementation.	 $83,000 $245,000 $330,000	 $146,000 $105,000 $250,000	 $463,000 $45,000 $510,000	 $203,000 $105,000 $310,000	 $132,000 $110,000 $240,000

Table 18

Comparative Analysis of Remedial Alternatives: Oil Staging Area

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Alternative 1 No Action for Soil and Groundwater	Alternative 2 Perform Soil Vapor Extraction ("SVE") in Soil, and Monitor Natural Attenuation in Groundwater	Alternative 3 Perform SVE in Soil, and Conduct In-Situ Air Sparging ("IAS") in Groundwater	Alternative 4 Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater	Alternative 5 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater	Alternative 6 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region ("RWQCB") is not anticipated to accept alternative.	It is expected that RWQCB may consider this alternative to be acceptable.	It is expected that RWQCB may consider this alternative to be acceptable.	It is expected that RWQCB may consider this alternative to be acceptable.	It is expected that RWQCB will consider this alternative to be acceptable.	It is expected that RWQCB may consider this alternative to be acceptable.
Modifying Criteria	• Community Acceptance	Alternative is not anticipated to be accepted by community members.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.	Alternative is likely to be an acceptable alternative to the community.
•	Six Factors from State of California Health and Safety Code Section 25356.1	Alternative does not comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.
•	Summary of Evaluation Criteria	**Alternative is Not Selected.** Alternative is not protective of human health and the environment, and does not comply with ARARs.	**Alternative is Not Selected.** Without any active remedial action in groundwater, alternative is not as effective as other options in the short-term. Also, this alternative does not address contaminated soil near the former containment sump.	**Alternative is Not Selected.** This alternative does not address contaminated soil near the former containment sump.	**Alternative is Not Selected.** This alternative is not as cost-effective as other options. Also, groundwater extraction and treatment may not be as effective in the short term.	**Selected Alternative.** This alternative will reduce the volume, toxicity, and mobility of COCs in soil, soil gas, and groundwater. It is protective of human health and the environment and complies with ARARs.	**Alternative is Not Selected.** Groundwater extraction and treatment will not be as effective as air sparging in the short term, as it will likely take longer to establish a zone of capture.

Notes

(1) See Appendix D for the calculation of the capital and annual costs of each alternative.

Table 19

Comparative Analysis of Remedial Alternatives: Building L Area

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Alternative 1 No Action for Soil and Groundwater	Alternative 2 Excavate Soil and Dispose Off-Site, and No Action for Groundwater
Threshold Criteria	• Overall Protection of Human Health and the Environment	Alternative is not anticipated to be protective of human health or the environment.	Alternative is expected to be protective of human health and the environment.
	• Compliance with ARARs	Alternative is not anticipated to comply with ARARs.	Alternative is expected to comply with ARARs.
Balancing Criteria	• Long-term Effectiveness and Permanence	Alternative will not offer long-term protection against exposure of humans and ecological receptors to chemicals of concern ("COCs") in soil or groundwater.	Alternative will offer long-term effectiveness as impacted soil will be removed from the Site.
	• Reduction of Toxicity, Mobility or Volume through Treatment	Alternative will not reduce toxicity, mobility, or volume of COCs.	Alternative will reduce mobility and volume of COCs in the subsurface by removal of impacted soil.
	• Short-term Effectiveness	Alternative is not anticipated to result in any short-term disruptions or risks to workers and the community.	Alternative is not anticipated to result in any short-term disruptions or risks to workers and the community, other than minor soil removal activities.
	• Implementability	Alternative can be easily implemented.	Alternative can be implemented, as it involves standard excavation techniques.
	• Cost (1) Total Estimated Capital Cost Total Estimated Annual Cost TOTAL:	Alternative has negligible costs associated with implementation.	 $470,000 $0 $470,000

Table 19

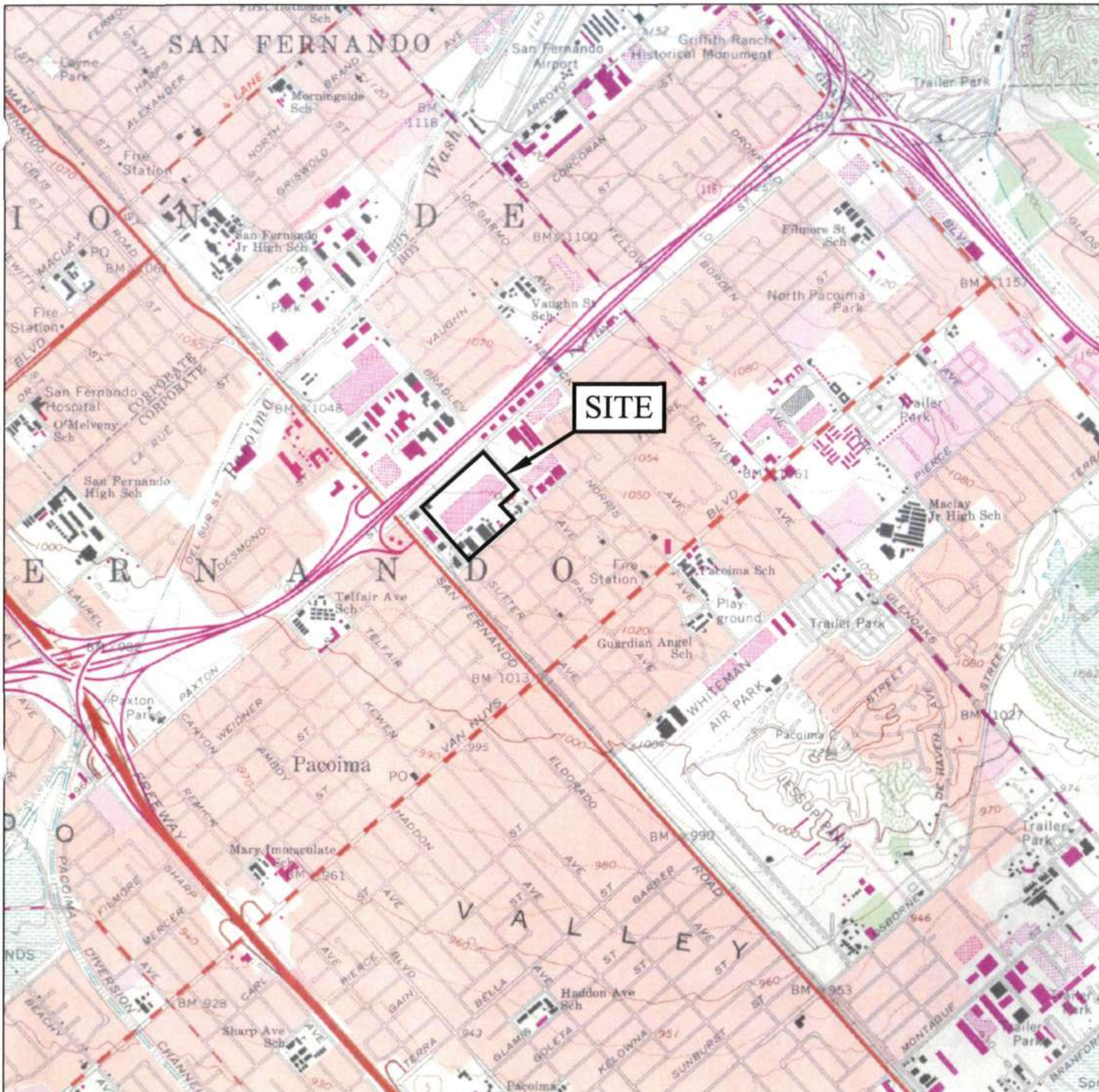
Comparative Analysis of Remedial Alternatives: Building L Area

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Evaluation Criteria	Alternative 1 No Action for Soil and Groundwater	Alternative 2 Excavate Soil and Dispose Off-Site, and No Action for Groundwater
Modifying Criteria	• State Acceptance	Regional Water Quality Control Board, Los Angeles Region ("RWQCB") is not anticipated to accept alternative.	It is expected that RWQCB will consider this alternative to be acceptable.
Modifying Criteria	• Community Acceptance	Alternative is not anticipated to be accepted by community members.	Alternative is likely to be an acceptable alternative to the community.
•	Six Factors from State of California Health and Safety Code Section 25356.1	Alternative does not comply with State of California Health and Safety Code Criteria.	Alternative is believed to comply with State of California Health and Safety Code Criteria.
•	Summary of Evaluation Criteria	**Alternative is Not Selected.** Alternative is not protective of human health and the environment, and does not comply with ARARs.	**Selected Alternative.** This alternative is protective of human health and the environment and complies with ARARs.

Notes

(1) See Appendix D for the calculation of the capital and annual costs of each alternative.



Reference: U.S.G.S. 7.5 Minute Series Topographic Map,
"San Fernando" Quadrangle, 1966 photorevised 1988.

Note:

1. All locations are approximate.

N

0 2000 4000

(Approximate Scale in Feet)

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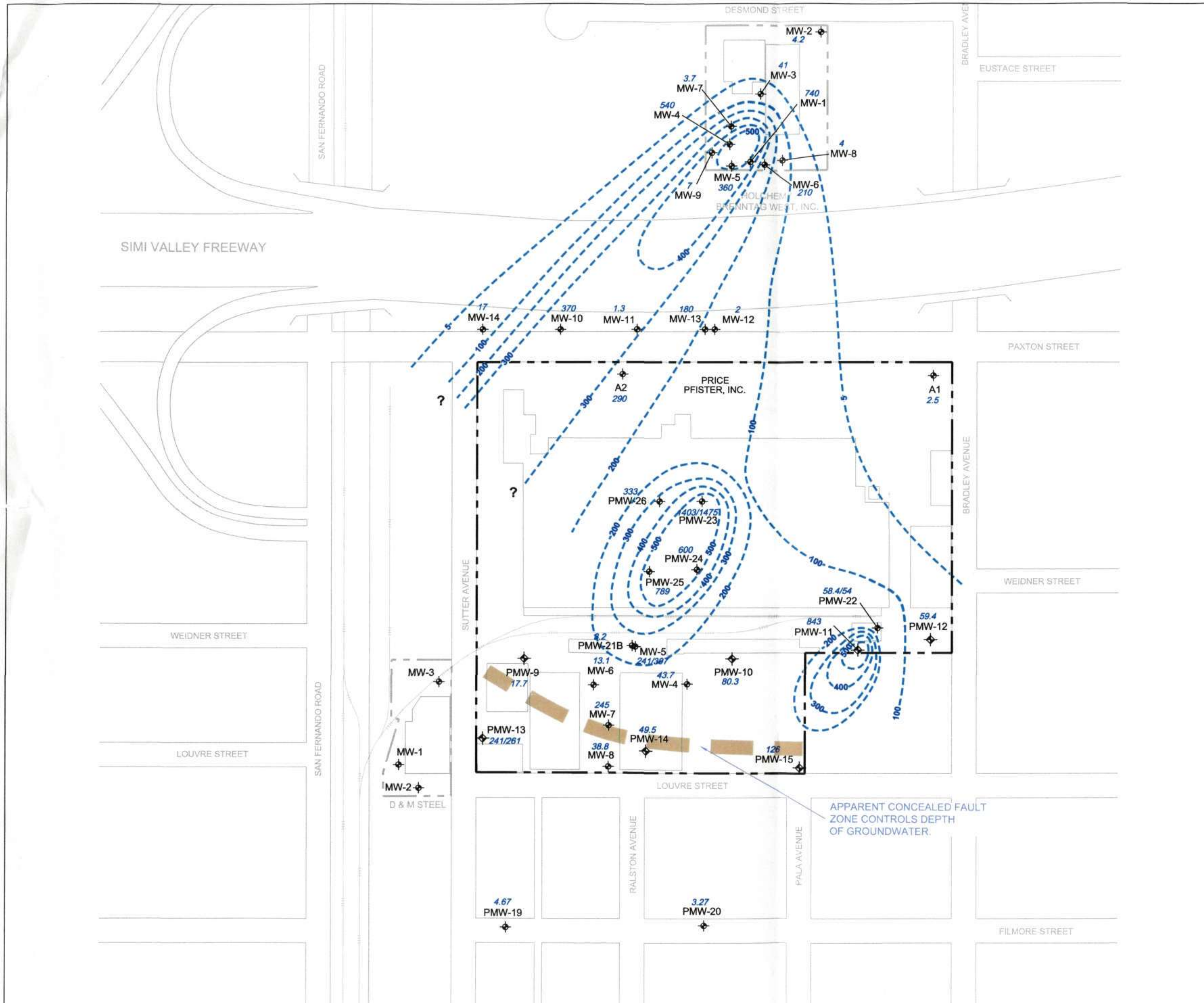
Site Vicinity Map

Price Pfister, Inc.
Pacoima, CA

April 2003
A20034.03

Figure 1



0 250 500

(Approximate Scale in Feet)

Legend:

- Groundwater Monitoring Well
- Soil Vapor/Groundwater Monitoring Well
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- 59.4 PCE Concentration (µg/L)
- 5 Inferred Isoconcentration Contour (µg/L)

Abbreviations:

PCE = Tetrachloroethene
µg/L = micrograms per liter
MCL = Maximum Contaminant Level for drinking water

Notes:

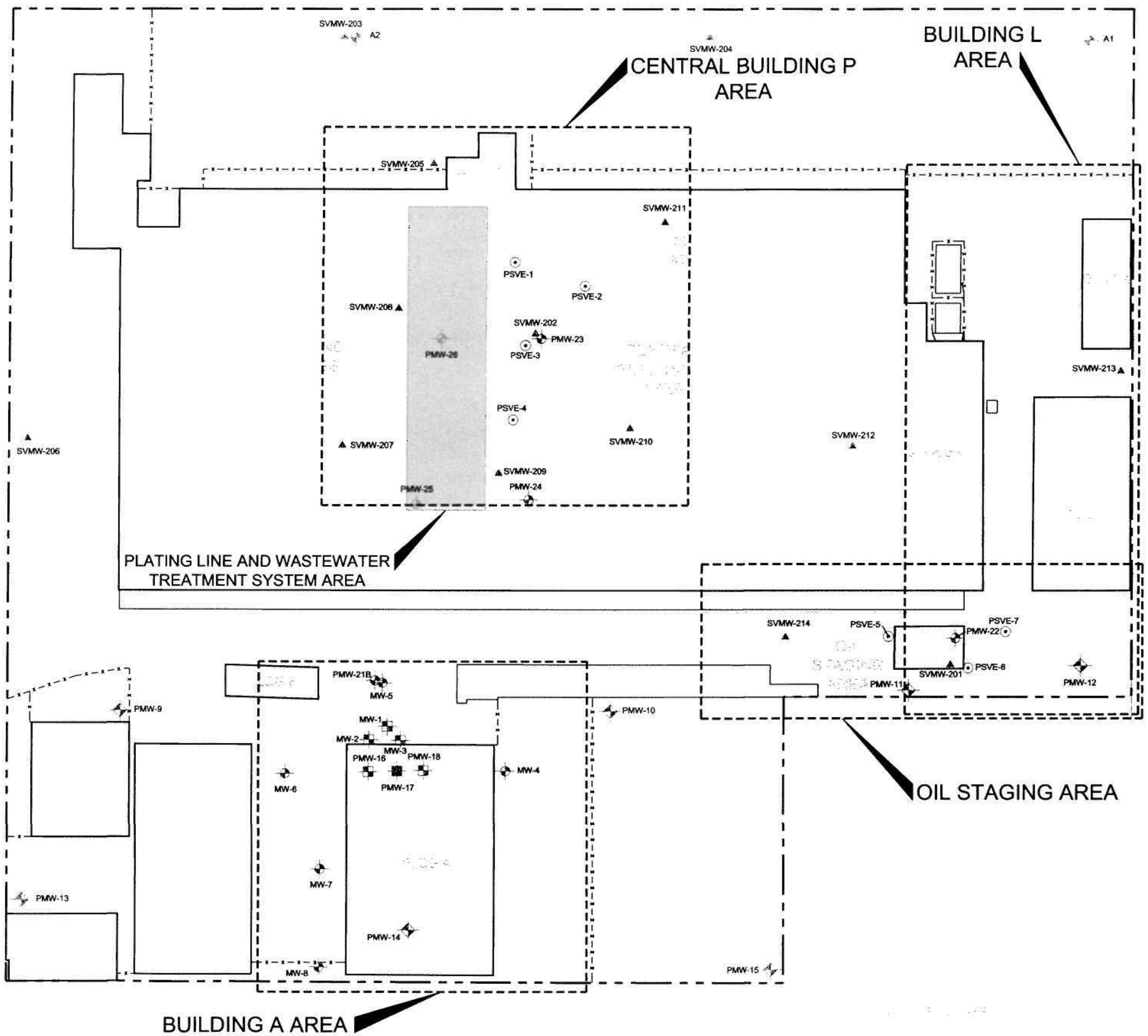
1. All locations are approximate.
2. The MCL for PCE is 5 µg/L.
3. The PCE concentration data shown are from three different sampling events in 2002. Holchem data are from 13-15 August 2002 and Price Pfister data are from 7-8 November 2002 or 5-6 December 2002.
4. The well screens for Price Pfister well PMW-21B and Holchem/Brenntag West wells MW-1, MW-7, MW-8, MW-9, MW-11, and MW-12 are deep wells only screened below the groundwater table. Data from these wells were not used to determine concentration contours.

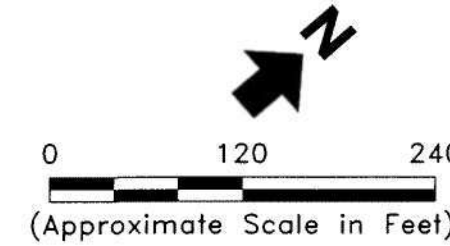
Erler & Kalinowski, Inc.

Inferred Distribution of PCE in Groundwater

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 2





Legend:

- Soil Vapor Monitoring Well
- Soil Vapor Extraction Well
- Groundwater Monitoring Well
- Soil Vapor/Groundwater Monitoring Well
- Free Hydrocarbon Product Collection Well
- Soil Vapor Monitoring/Free Hydrocarbon Product Collection Well
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence

Note:

1. All locations are approximate.

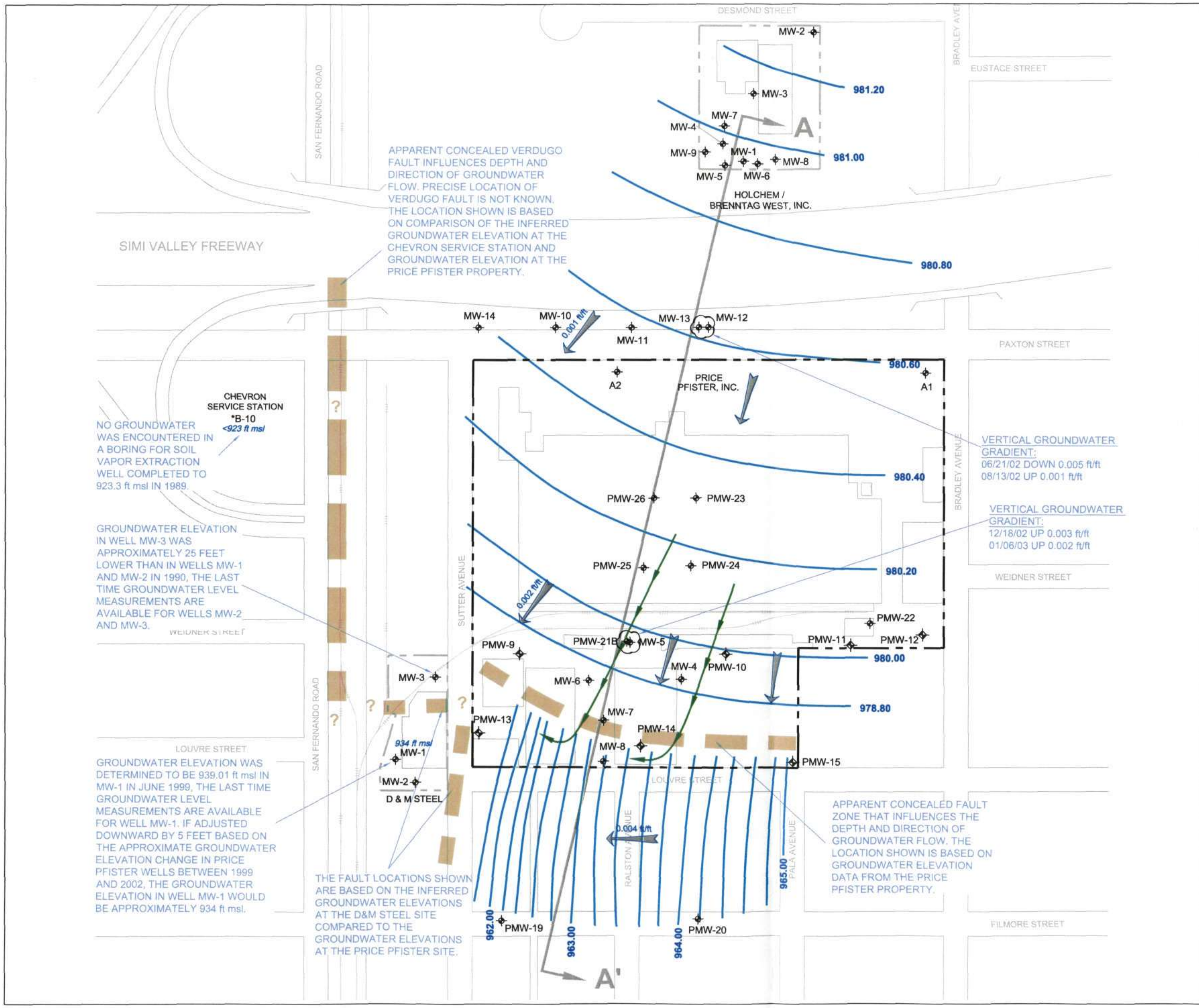
Erler & Kalinowski, Inc.

Identified Detail Areas and Existing Well Locations

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

Figure 3



N

0 250 500

(Approximate Scale in Feet)

Legend:

- Groundwater Monitoring Well
- Soil Vapor/Groundwater Monitoring Well
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- 980.8 Inferred Groundwater Elevation Contour; ft msl
- 0.004 ft/ft Magnitude and Direction of Horizontal Groundwater Gradient
- Projected Groundwater Flow Path
- A A' Cross-Section Location

Abbreviations:

ft msl = feet above mean sea level

Notes:

1. All locations are approximate.
2. Price Pfister Well PMW-21B and Holchem/Brenntag West, Inc. wells MW-1, MW-7, MW-8, MW-9, MW-11 and MW-12 are screened below the water table.
3. The identified groundwater elevation contours for the Price Pfister property are based on measurements collected 6 January 2003. The groundwater elevation contours for the Holchem facility are based on measurements collected 13 August 2002, which have been adjusted downward by subtracting 1.9 feet. The adjustment of 1.9 feet is based on the approximate average decrease in groundwater elevations in Price Pfister monitoring wells from 12 August 2002 to 6 January 2003.

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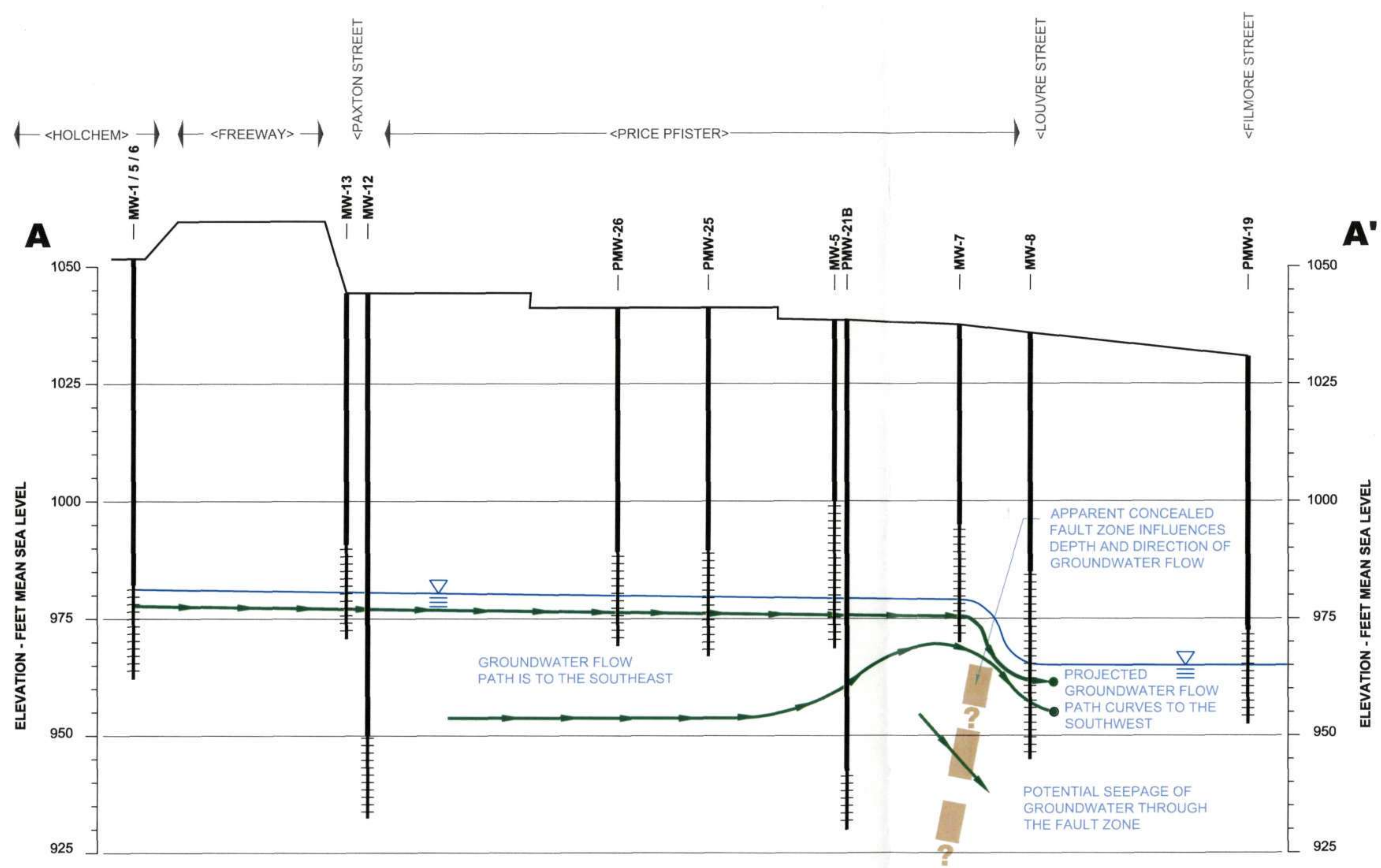
Plan View Illustrating Generalized Groundwater Flow Conditions

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 4



CROSS-SECTION A-A'

Legend:

Projected Groundwater Flow Path

Well Screen Interval

Top of Groundwater Surface

Note:

1. All locations are approximate.

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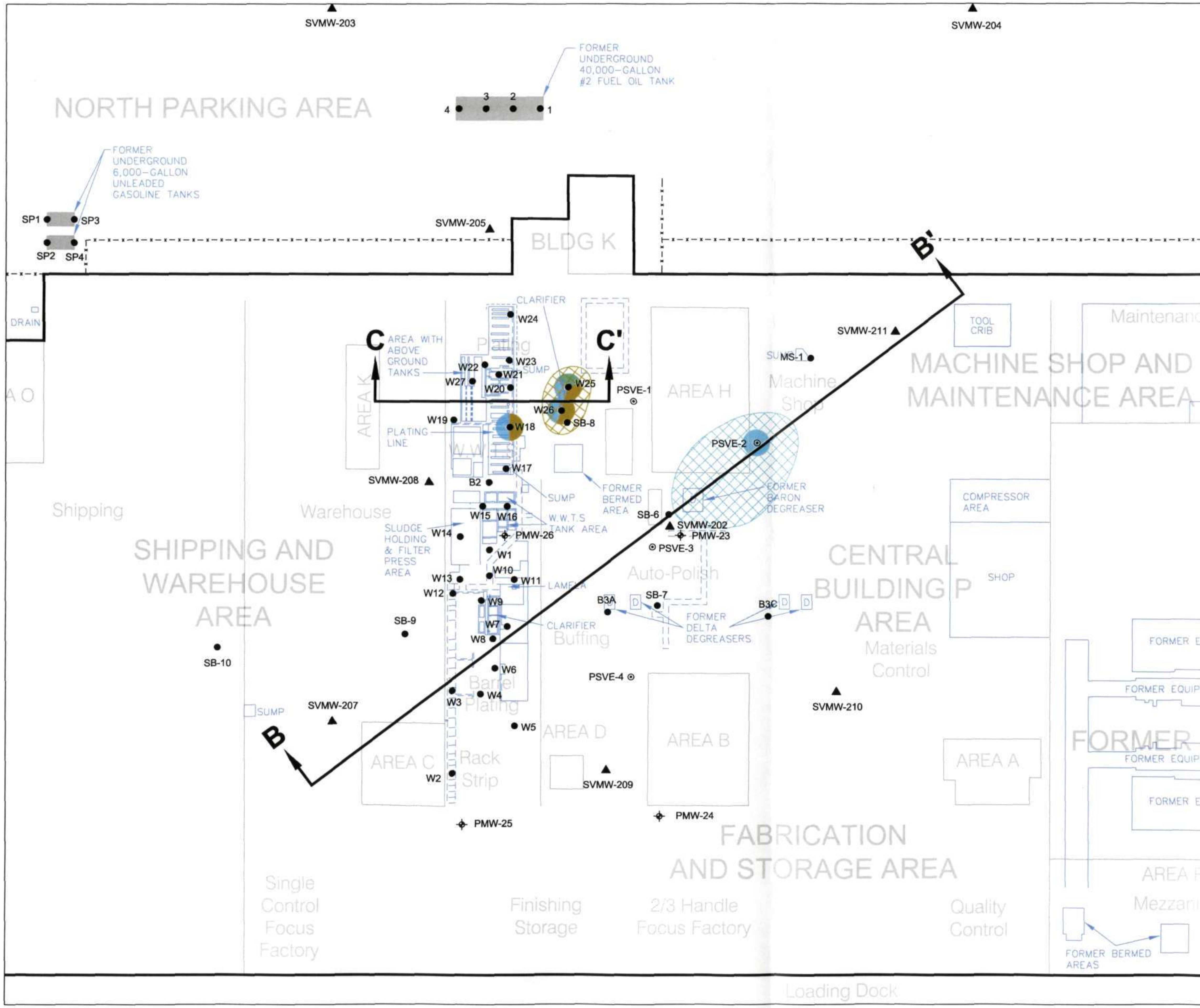
Cross-Section View Illustrating Generalized Groundwater Flow Conditions

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

Figure 5



N

0 60 120

(Approximate Scale in Feet)

Legend:

- Soil Sample
- Soil Vapor Monitoring Well
- Soil Vapor Extraction Well
- Former Above Ground or Underground Storage Tank or Process Unit
- Existing Interior Wall or Office
- Out-of-Service Railroad Spur
- Fence
- Former or Existing Trench
- Cross-Section Location (B B')
- Location Where PCE is Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where PCE May Be Present in Soil Above Direct Contact Remediation Goal
- Location Where Total Extractable Petroleum Hydrocarbons are Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where Total Extractable Petroleum Hydrocarbons May Be Present in Soil Above Direct Contact Remediation Goal
- Location Where Metals are Present in Soil Above Direct Contact Remediation Goal

Abbreviations:

PCE = Tetrachloroethene

Notes:

1. All locations are approximate.
2. This figure indicates the presence of various historical Site features but may not include all such features. The actual size, shape and locations of these features may differ from that shown here. The locations of selected historical features were surveyed by Bill Carr Survey's, Inc. The locations of most features are based on a review of historical drawings, aerial photographs, and Site reconnaissance.

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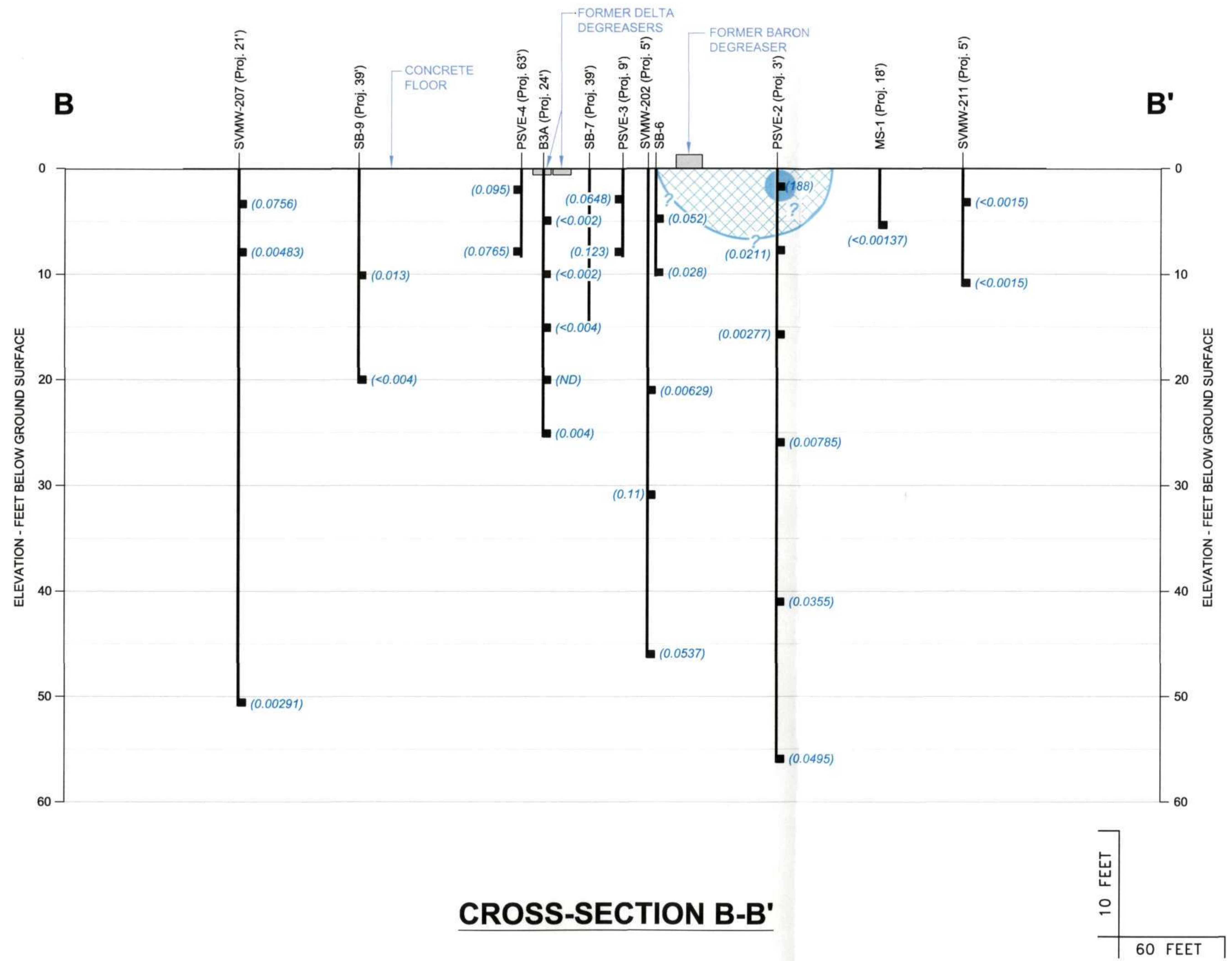
Environmental Conditions at Central Building P Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 6



CROSS-SECTION B-B'

Legend:

- SB-7 (Proj. 39') — Boring or Well Identification with Projected Distance
- Sample Location
- Former Above Ground or Underground Storage Tank or Process Unit
- *(188)* — Concentration of PCE in Soil (mg/kg)
- Location Where PCE is Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where PCE May Be Present in Soil Above Direct Contact Remediation Goal

Abbreviations:

PCE = Tetrachloroethene
mg/kg = milligrams per kilogram

Notes:

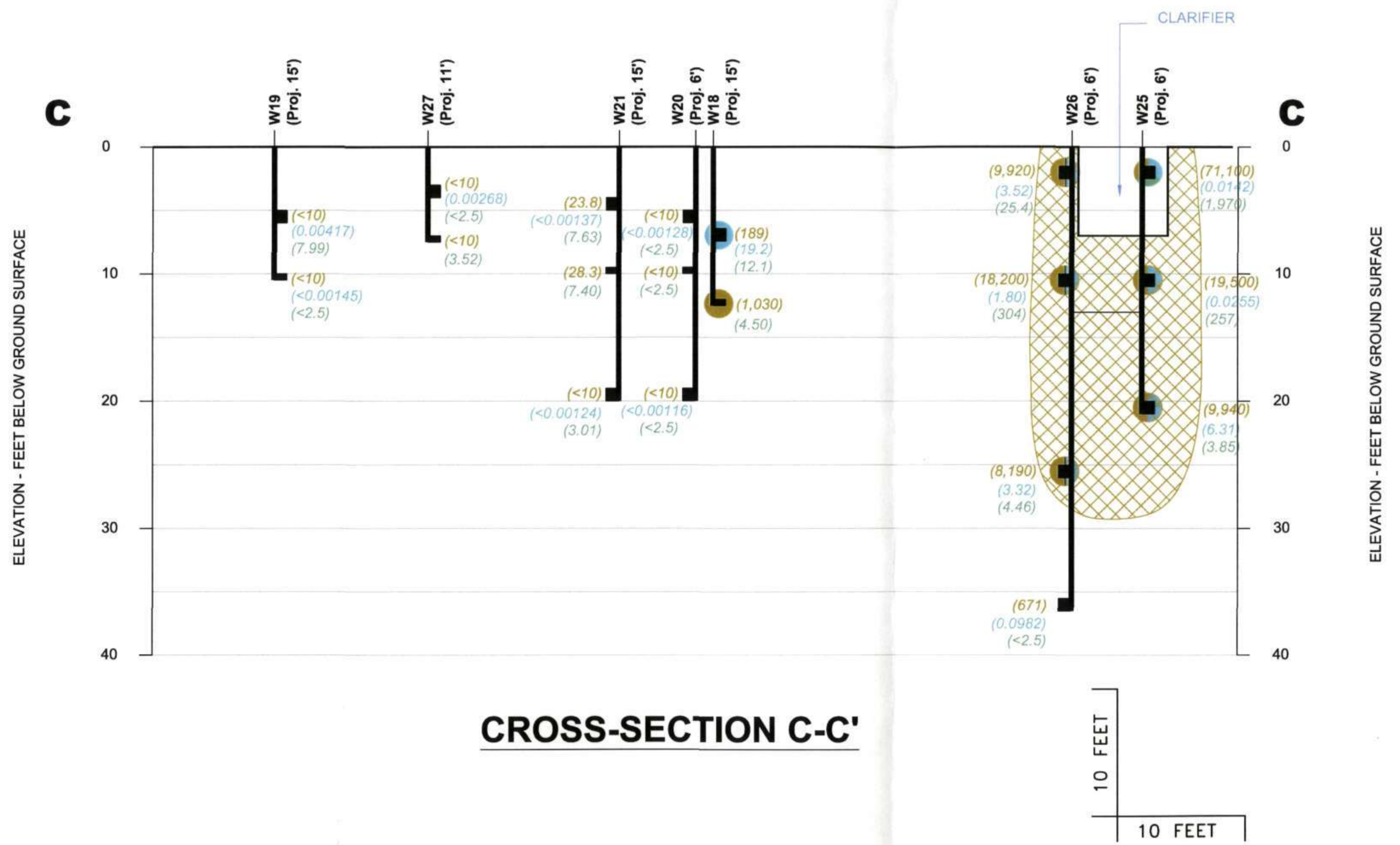
1. All locations are approximate.

Erler & Kalinowski, Inc.

Cross-Section B-B'
at Central Building P Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 7



CROSS-SECTION C-C'

Legend:

- W19 (Proj. 15') — Boring or Well Identification with Projected Distance
- Sample Location
- (<10.0) Concentration of Total Extractable Petroleum Hydrocarbons in Soil (mg/kg)
- (0.00417) Concentration of PCE in Soil (mg/kg)
- (7.99) Concentration of Lead in Soil (mg/kg)
- Location With VOC Concentrations Exceeding Direct Contact Remediation Goal
- Location With Metal Concentrations Exceeding Direct Contact Remediation Goal
- Location Where Petroleum Hydrocarbons are Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where Petroleum Hydrocarbons May Be Present in Soil Above Direct Contact Remediation Goal

Abbreviations:

PCE = Tetrachloroethene
mg/kg = milligrams per kilogram

Notes:

1. All locations are approximate.

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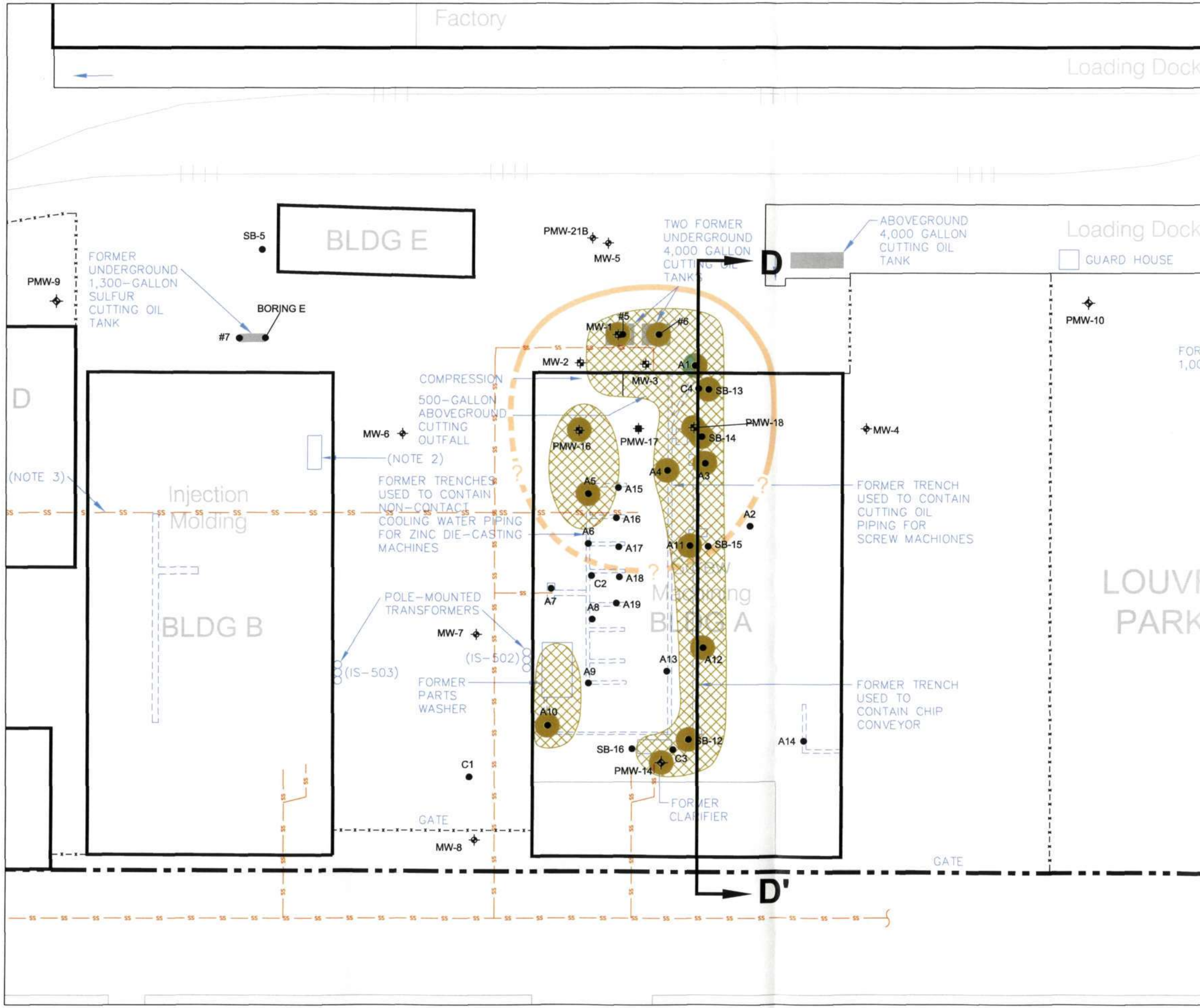
Cross-Section C-C'
at Plating Line and Waste Water Treatment Area
Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 8



N

0 50 100 (Approximate Scale in Feet)

Legend:

- Soil Sample
- Groundwater Monitoring Well
- Soil Vapor/Groundwater Monitoring Well
- Free Hydrocarbon Product Collection Well
- Soil Vapor Monitoring/Free Hydrocarbon Product Collection Well
- Former Aboveground or Underground Storage Tank or Process Unit
- Existing Interior Wall or Office
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- Former or Existing Trench
- Existing Sanitary Sewer Line
- Approximate Extent of Free Hydrocarbon Product on Groundwater
- D D' Cross-Section Location
- Location Where Total Extractable Petroleum Hydrocarbons are Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where Total Extractable Petroleum Hydrocarbons May Be Present in Soil Above Direct Contact Remediation Goal
- Location Where Metals are Present in Soil Above Direct Contact Remediation Goal

Notes:

1. All locations are approximate.
2. The shown locations of sewer lines may be significantly different than the actual.

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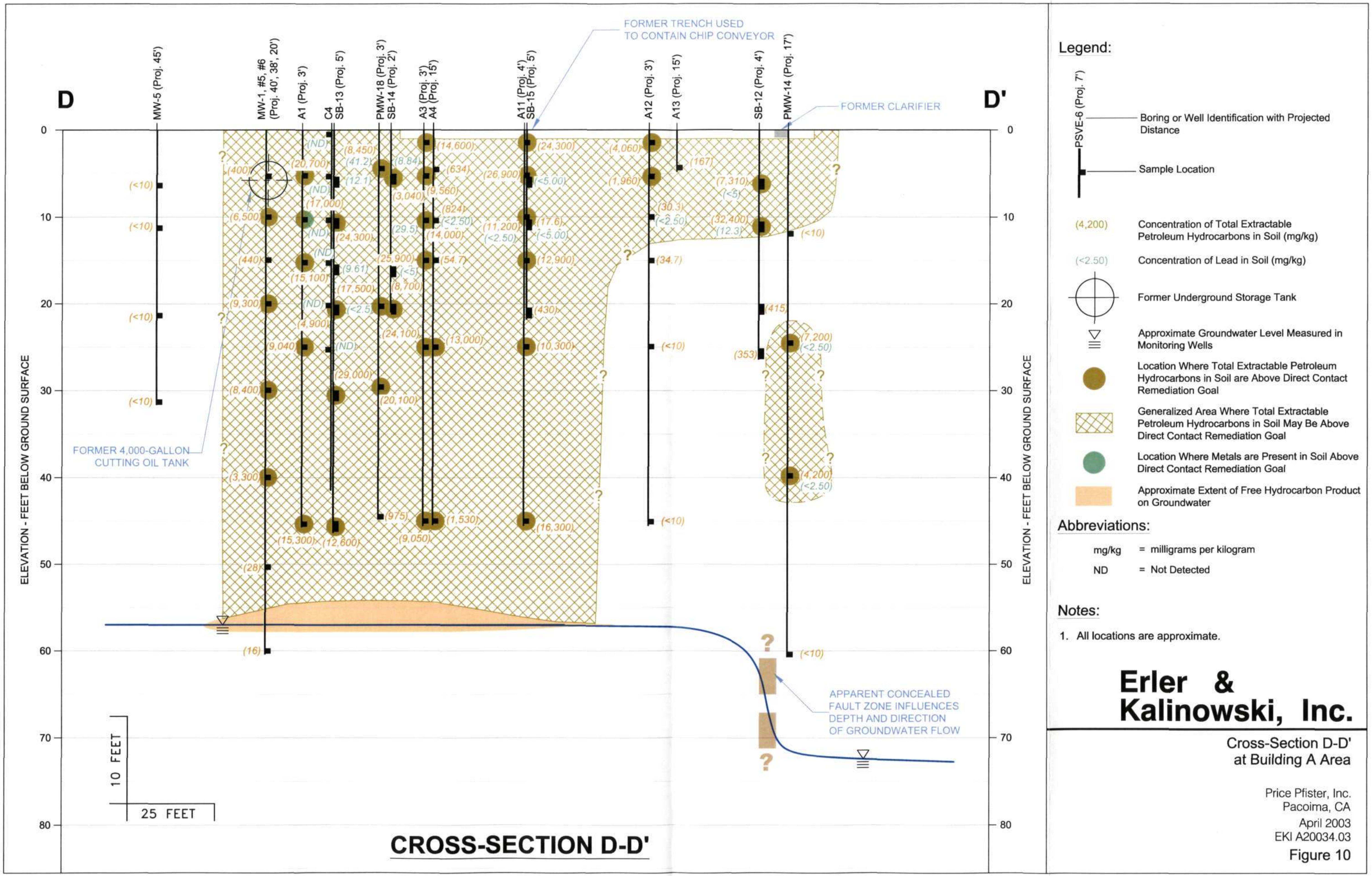
Environmental Conditions at Building A Area

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

Figure 9



CROSS-SECTION D-D'

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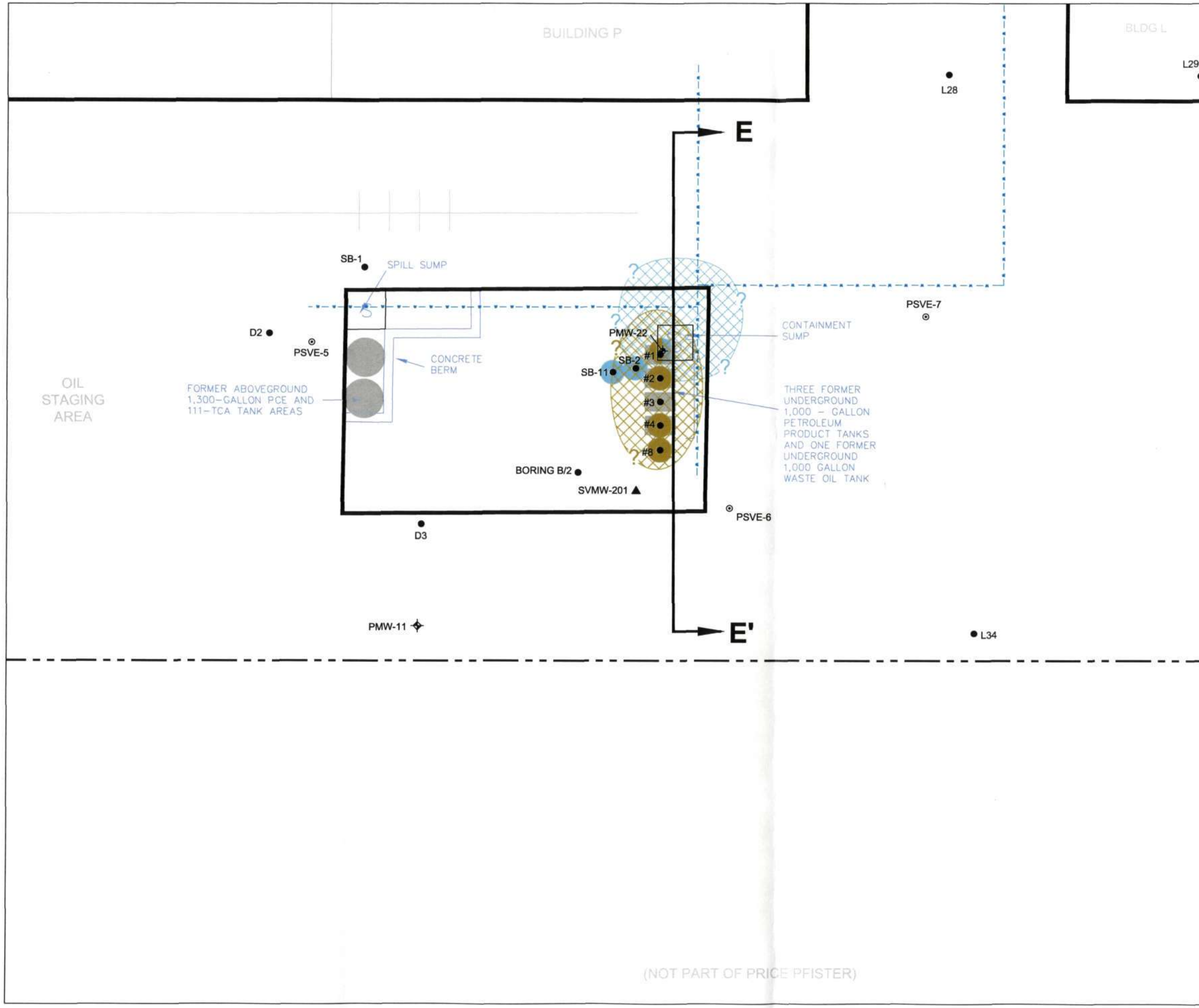
Cross-Section D-D'
at Building A Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 10



N

0 20 40
(Approximate Scale in Feet)

Legend:

- Soil Sample
- Soil Vapor Monitoring Well
- Soil Vapor Extraction Well
- Groundwater Monitoring Well
- Soil Vapor/Groundwater Monitoring Well
- Former Above Ground or Underground Storage Tank or Process Unit
- Existing Interior Wall or Office
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Former or Existing Trench
- Water Line
- E E' Cross-Section Location
- Location Where PCE is Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where PCE May Be Present in Soil Above Direct Contact Remediation Goal
- Location Where Total Extractable Petroleum Hydrocarbons are Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where Total Extractable Petroleum Hydrocarbons May Be Present in Soil Above Direct Contact Remediation Goal

Abbreviations:

PCE = Tetrachloroethene

Notes:

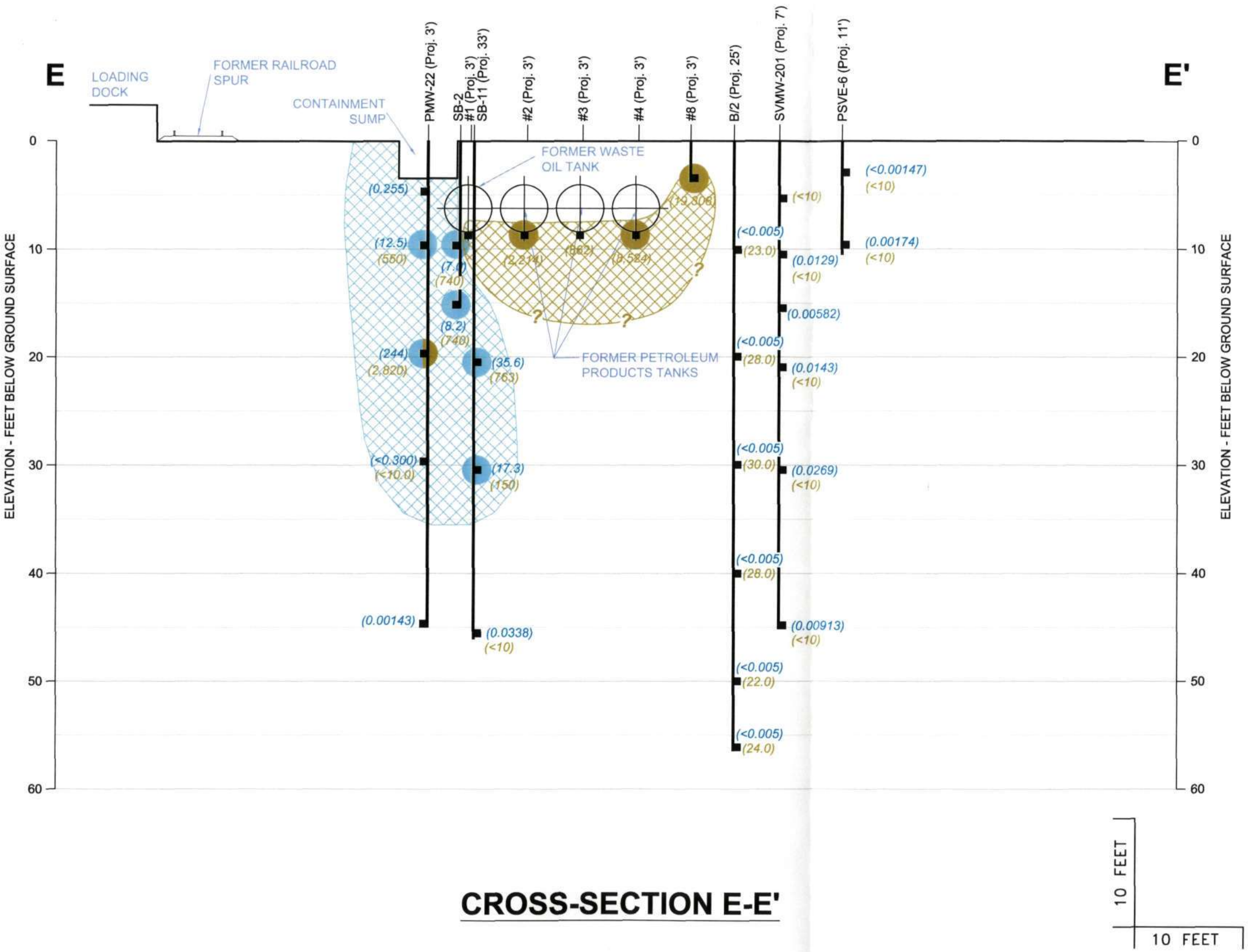
1. All locations are approximate.

Erler & Kalinowski, Inc.

Environmental Conditions at Oil Staging Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 11



CROSS-SECTION E-E'

Legend:

- Boring or Well Identification with Projected Distance (PSVE-6 (Proj. 7'))
- Sample Location
- Former Underground Storage Tank
- (<0.00147) Concentration of PCE in Soil (mg/kg)
- (<10) Concentration of Total Extractable Petroleum Hydrocarbons in Soil (mg/kg)
- Location Where PCE is Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where PCE in Soil May Be Above Direct Contact Remediation Goal
- Location Where Total Extractable Petroleum Hydrocarbons in Soil are Above Direct Contact Remediation Goal
- Generalized Area Where Total Extractable Petroleum Hydrocarbons in Soil May Be Above Direct Contact Remediation Goal

Abbreviations:

mg/kg = milligrams per kilogram

PCE = Tetrachloroethene

Notes:

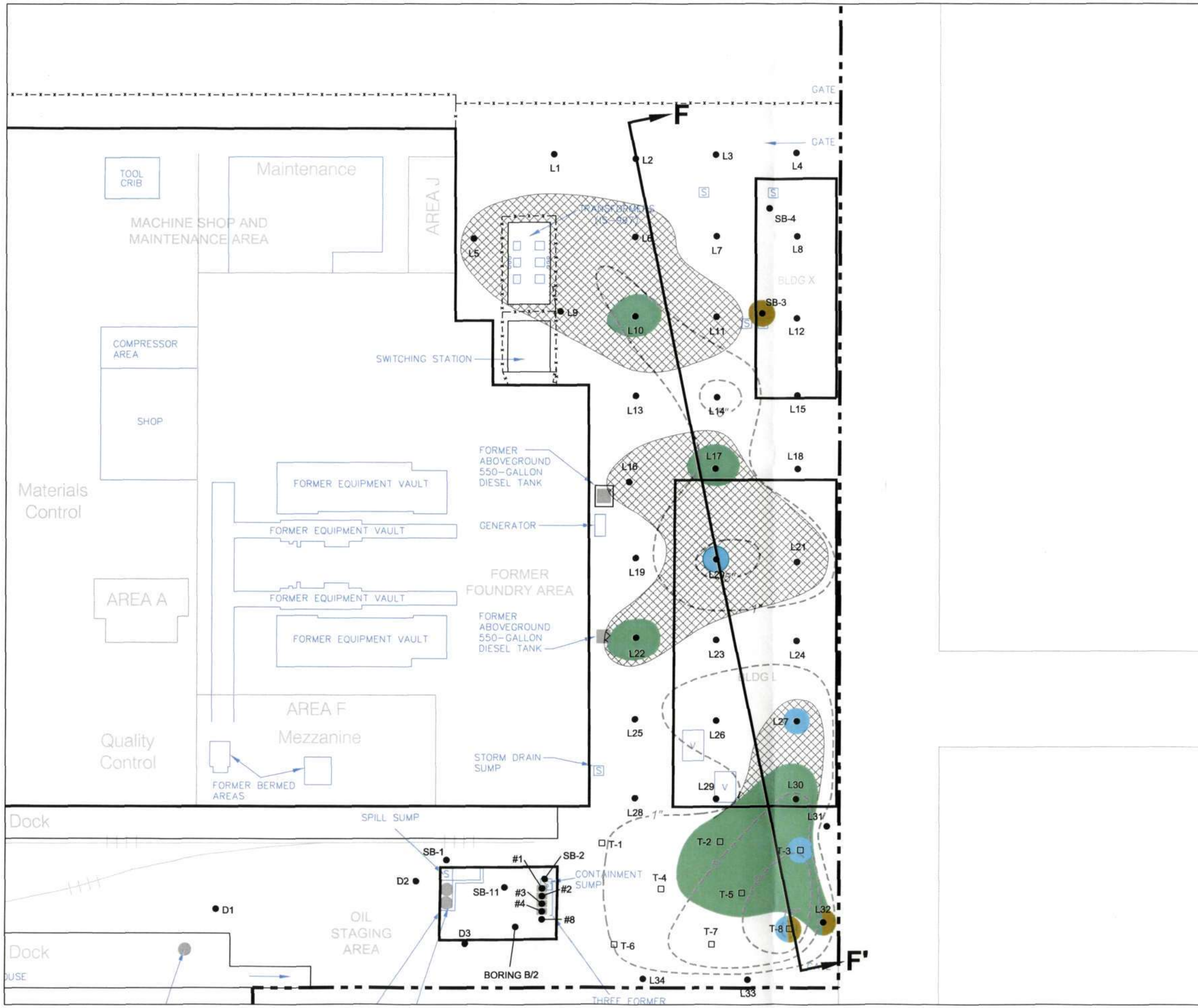
1. All locations are approximate.

Erler & Kalinowski, Inc.

Cross-Section E-E' at Oil Staging Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 12



0 60 120
(Approximate Scale in Feet)

Legend:

- Soil Sample
- Trench Soil Sample
- Former Aboveground or Underground Storage Tank or Process Unit
- Existing Interior Wall or Office
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- Former or Existing Trench
- Approximate Thickness of Black Sand Observed Below Asphalt Pavement (in Inches)
- Cross-Section Location
- Location Where Tetrachloroethene ("PCE") is Present in Soil Above Direct Contact Remediation Goal
- Generalized Area Where Metals in Soil are Above Direct Contact Remediation Goals and Possibly Criteria for Hazardous Waste
- Location Where Total Extractable Petroleum Hydrocarbons are Present in Soil Above Direct Contact Remediation Goals
- Generalized Area Where Metals in Soil may be Present Above Direct Contact Remediation Goals and Possibly Criteria for Hazardous Waste

Notes:

1. All locations are approximate.

Erler & Kalinowski, Inc.

Environmental Conditions at Building L Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03
Figure 13

L-10						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.25 - 0.75	0.0103	<0.00148	3,050	840	3,450	NA
1.5 - 2	NA	NA	6.25	<2.5	14.0	NA

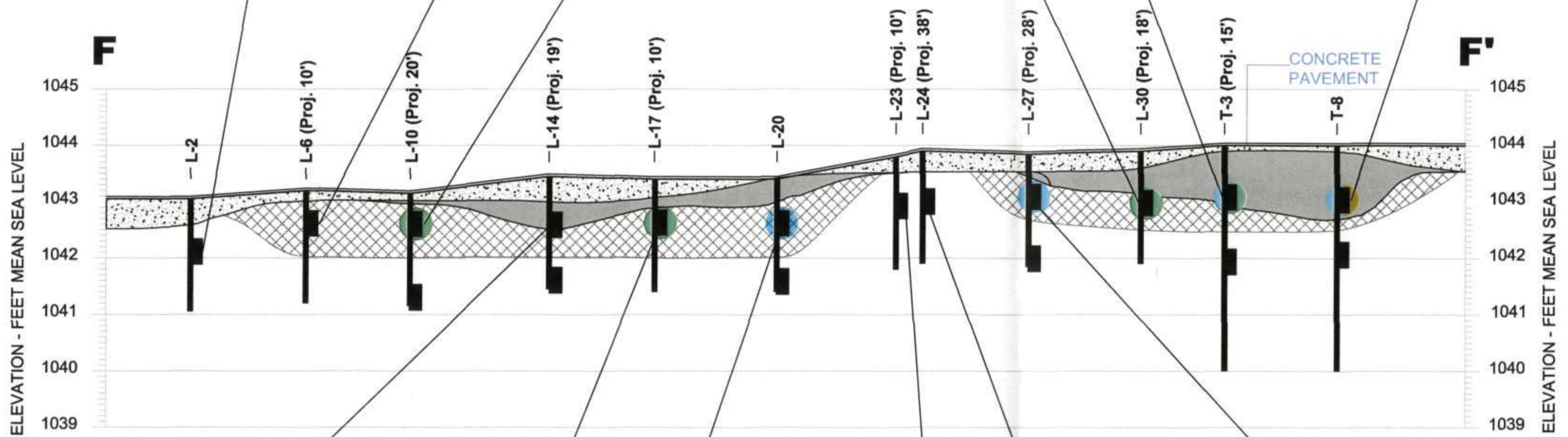
L-30						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	NA	NA	2,520	798	5,730	664

L-6						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.25 - 0.75	NA	NA	1,740	440	1,850	NA

T-3						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	10.2	1.61	9,840	1,860	12,500	614
1.5 - 2	NA	NA	22.5	10.8	47.6	<10

L-2						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	NA	NA	23.1	10.5	41.6	NA

T-8						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	179	3.91	91.3	31.3	231	14,000
1.5 - 2	NA	NA	10.0	<5.0	34.9	NA



L-14						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	NA	NA	417	318	2,850	172
1.5 - 2	NA	NA	17.5	4.11	2,450	NA

L-27						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	5.34	0.419	688	354	1,820	227
1.5 - 2	NA	NA	15.1	2.87	25.5	NA

L-17						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	NA	NA	4,050	1,000	19,300	NA

L-24						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	NA	NA	12.6	9.14	903	NA

L-20						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	4.45	<0.399	284	381	2,800	306
1.5 - 2	NA	NA	9.30	2.63	23.3	NA

L-23						
Depth	PCE	TCE	Copper	Lead	Zinc	TEPH
0.5 - 1	NA	NA	294	194	1,190	NA

CROSS-SECTION F-F'

2.5 FEET

60 FEET

Legend:

PSVE-6 (Proj. 7') — Boring or Well Identification with Projected Distance

Sample Location

Location Where PCE is Present in Soil Above Direct Contact Remediation Goal

Location Where Metals in Soil are Above Direct Contact Remediation Goals and Possibly Criteria for Hazardous Waste

Location Where Total Extractable Petroleum Hydrocarbons in Soil are Above Direct Contact Remediation Goal

Apparent Extent of Black Sand Below Pavement

Generalized Area Where Metals in Soil may be Present Above Direct Contact Remediation Goals and Possibly Criteria for Hazardous Waste

Abbreviations:

<2.5	=	Analyte not detected above analytical method reporting limit shown.
NA	=	Sample not tested for this analyte or result not available.
PCE	=	Tetrachloroethene
TCE	=	Trichloroethene
TEPH	=	Total Extractable Petroleum Hydrocarbons

Notes:

1. All locations are approximate.
2. Analytical results are in milligrams per kilogram.
3. Sample depths are in feet below ground surface.

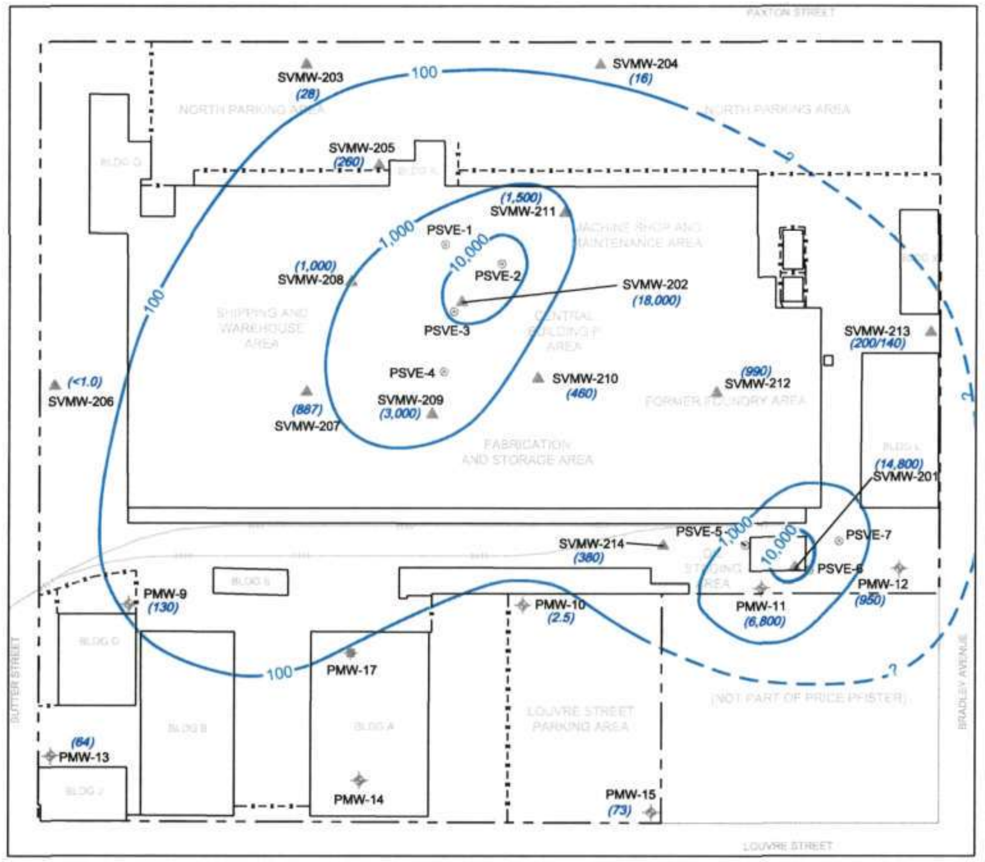
Erler & Kalinowski, Inc.

Cross-Section F-F'
at Building L Area

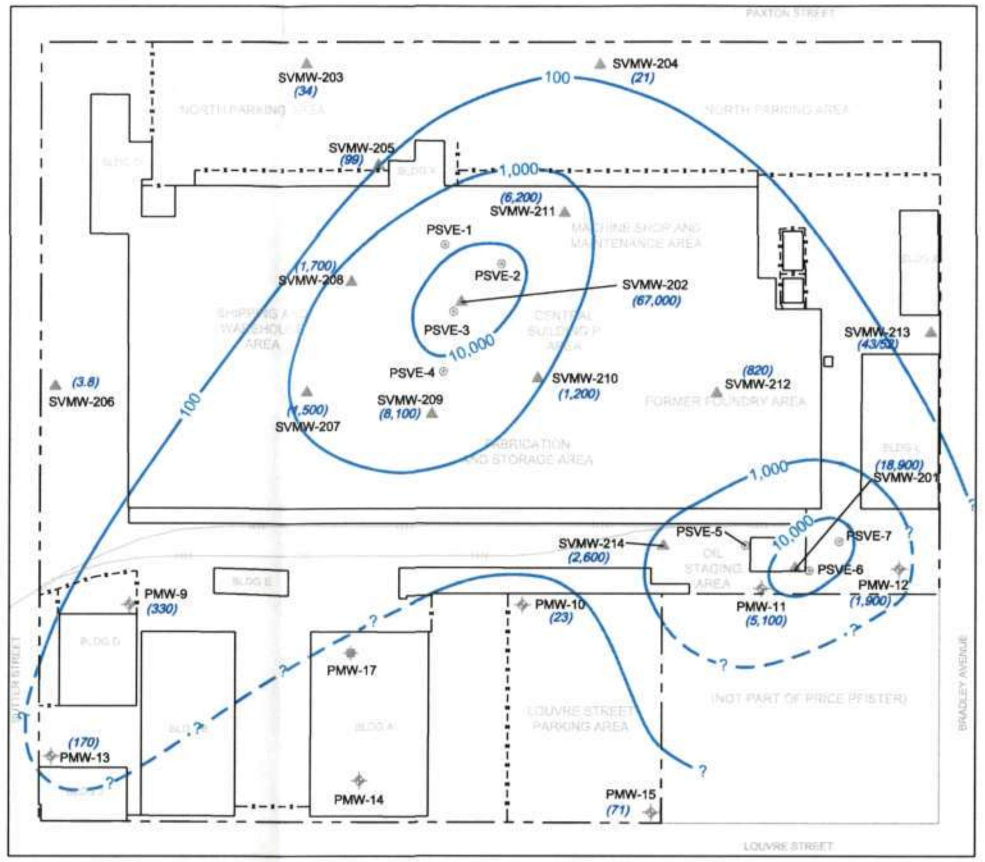
Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

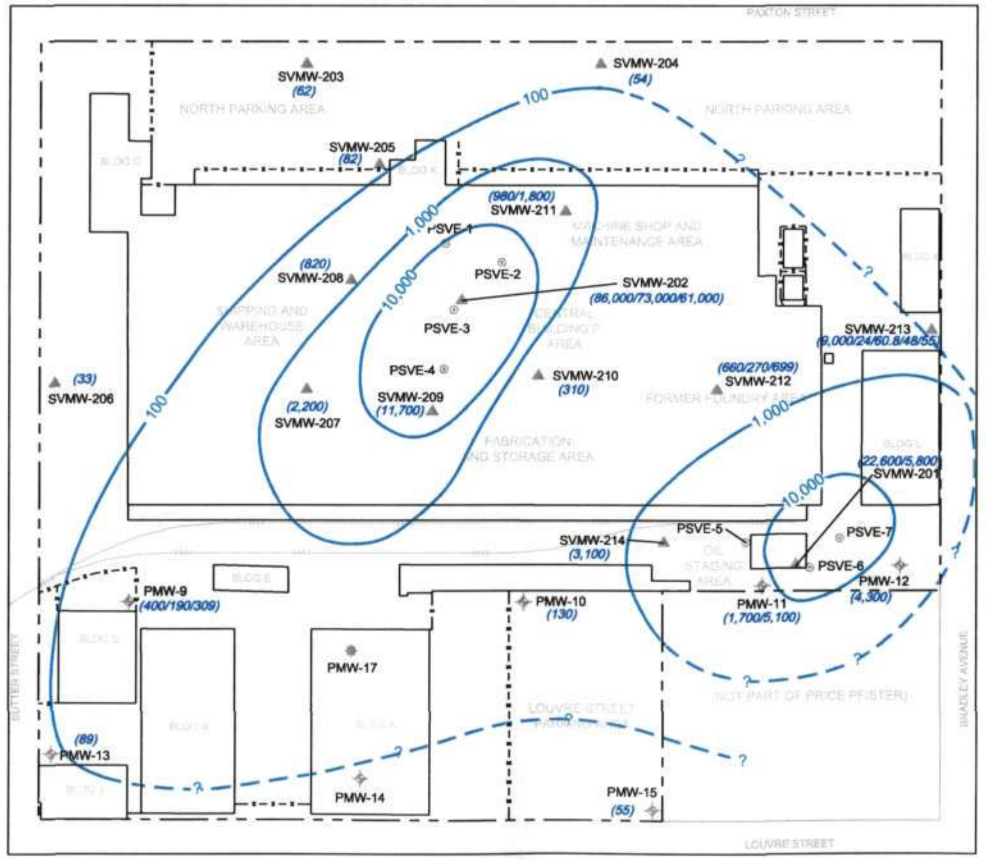
Figure 14



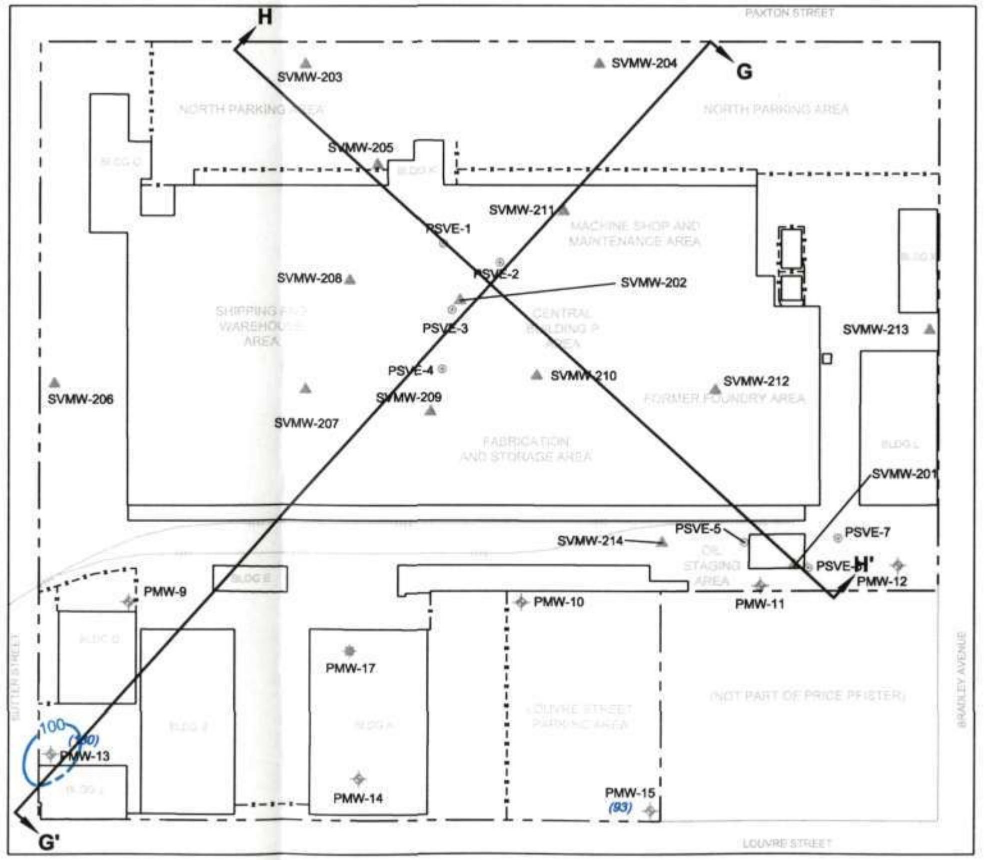
PCE Concentrations at First Screen (~10 to 24 ft bgs)



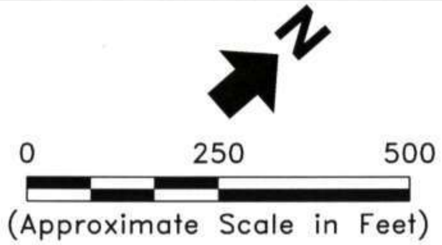
PCE Concentrations at Second Screen (~25 to 39 ft bgs)



PCE Concentrations at Third Screen (~40 to 54 ft bgs)



PCE Concentrations at Fourth Screen (~60 to 65 ft bgs)



Legend:

- Soil Vapor Monitoring Well
- Soil Vapor Extraction Well
- Soil Vapor/Groundwater Monitoring Well
- Soil Vapor Monitoring/Free Hydrocarbon Product Collection Well
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- 100 — Contour of Tetrachloroethene ("PCE") Concentration in Soil Gas (µg/L); Dashed Where Inferred
- G G' Cross-Section Location

Abbreviations:

ft bgs = feet below ground surface
µg/L = micrograms per liter
SVE = Soil Vapor Extraction

Notes:

1. All locations are approximate.
2. Analytical results are in micrograms per liter.
3. Analytical results shown are for samples collected in July 2002 before soil vapor extraction systems began operation in September 2002. Wells PMW-14 and PMW-17 were not installed before the July 2002 sampling.
4. Screen Intervals of vapor monitoring wells are as follows:

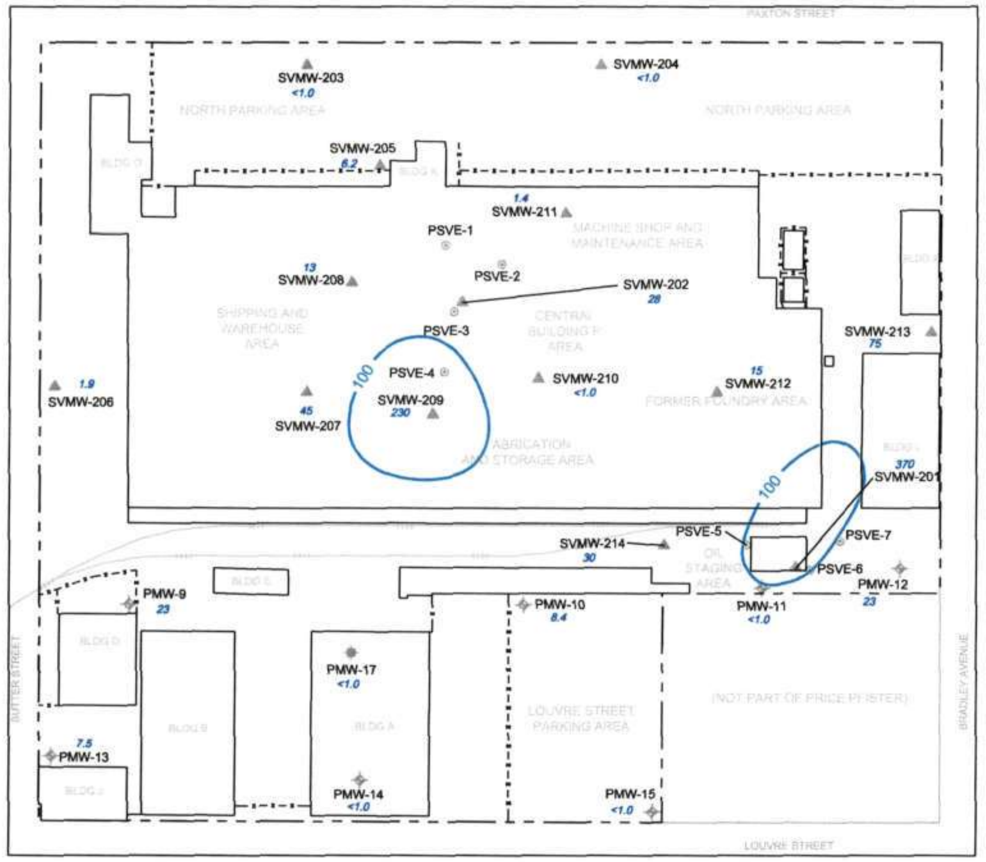
	PMW-13 and PMW-15	All Other Wells
First Screen Interval	Yes	Yes
Second Screen Interval	Yes	Yes
Third Screen Interval	Yes	Yes
Fourth Screen Interval	Yes	No

Erler & Kalinowski, Inc.

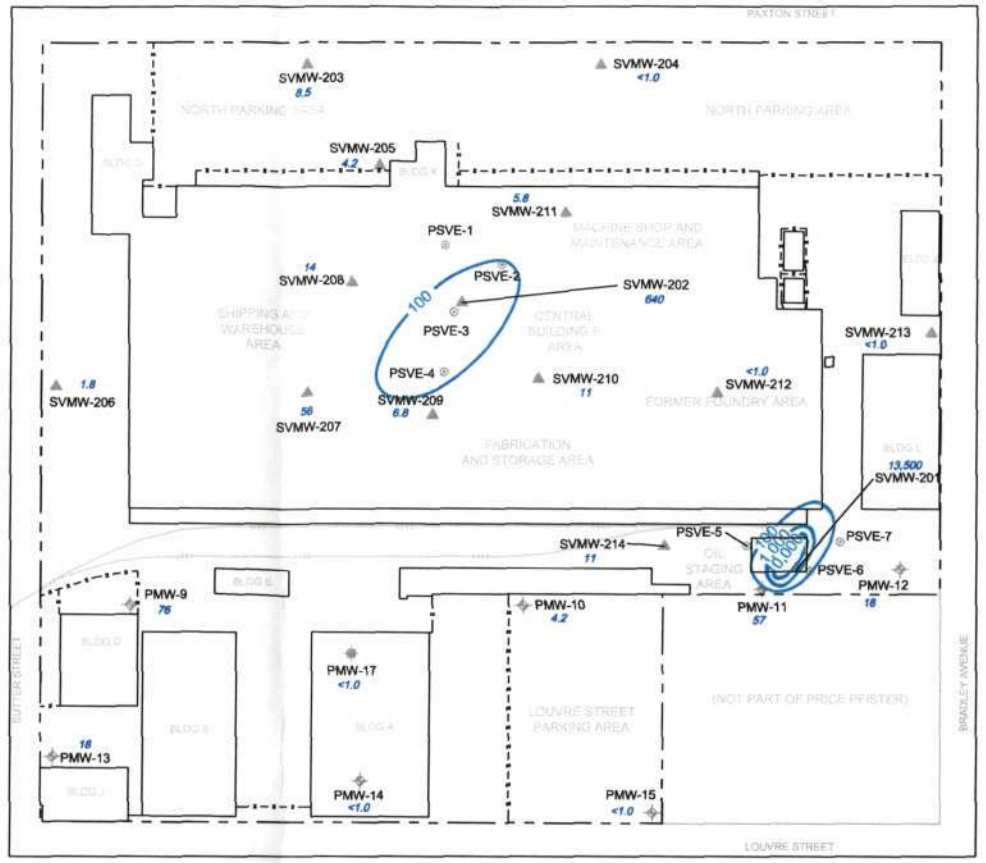
PCE Soil Gas Concentration Contours with Depth Before Start of SVE

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

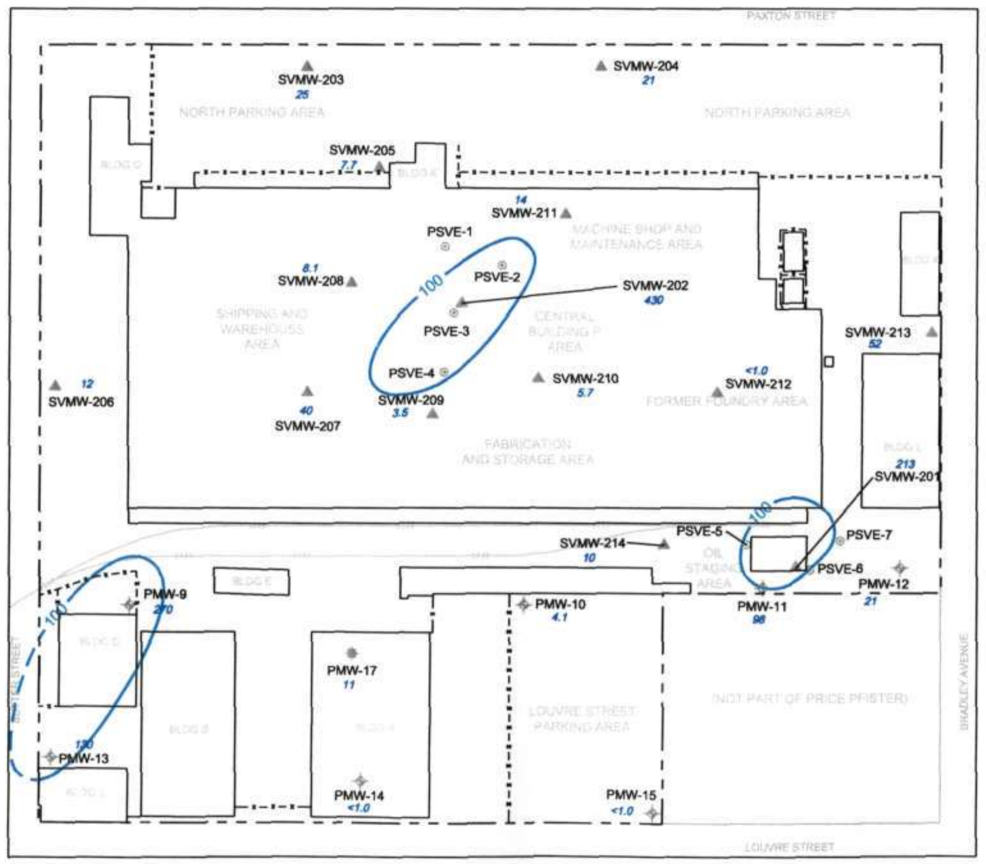
Figure 15



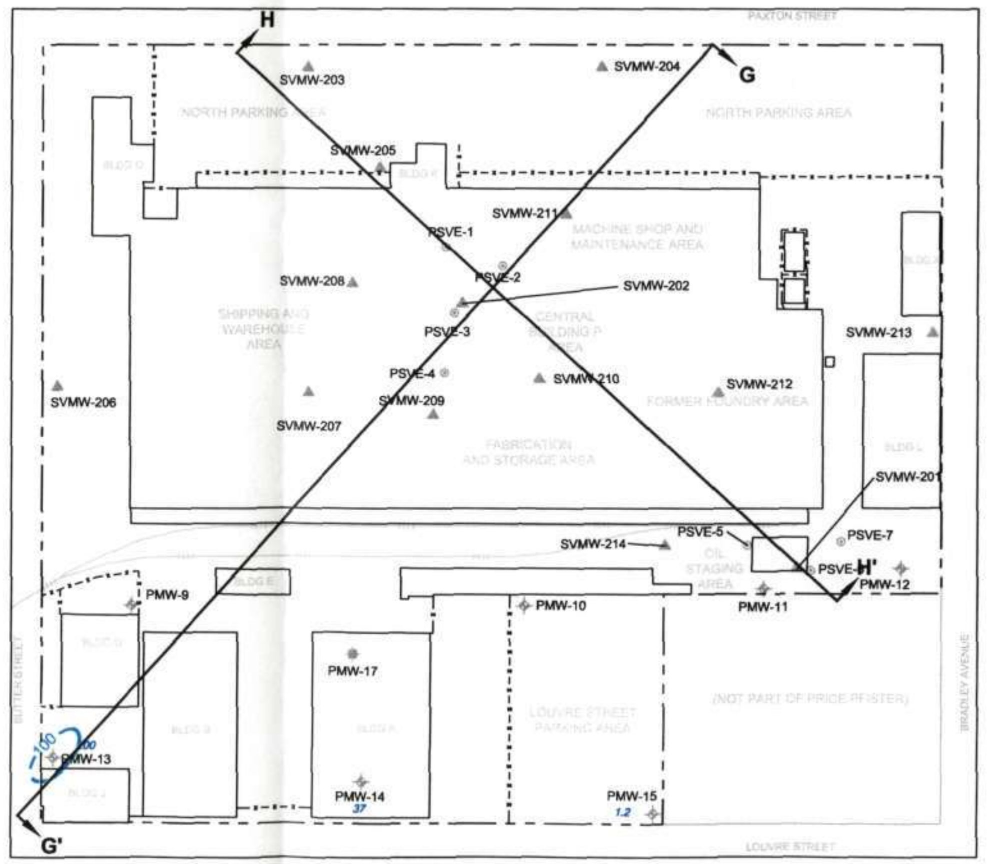
PCE Concentrations at First Screen (~10 to 24 ft bgs)



PCE Concentrations at Second Screen (~25 to 39 ft bgs)



PCE Concentrations at Third Screen (~40 to 54 ft bgs)



PCE Concentrations at Fourth Screen (~60 to 65 ft bgs)

0 250 500

(Approximate Scale in Feet)

Legend:

- Soil Vapor Monitoring Well
- Soil Vapor Extraction Well
- Soil Vapor/Groundwater Monitoring Well
- Soil Vapor Monitoring/Free Hydrocarbon Product Collection Well
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- 100 — Contour of Tetrachloroethene ("PCE") Concentration in Soil Gas (µg/L); Dashed Where Inferred
- G G' Cross-Section Location

Abbreviations:

ft bgs = feet below ground surface
µg/L = micrograms per liter

Notes:

1. All locations are approximate.
2. Analytical results shown are for samples collected 16 December 2002 to 19 December 2002 prior to temporary shutdown of soil vapor extraction systems on 20 December 2002.
3. Screen Intervals of vapor monitoring wells are as follows:

	PMW-13, PMW-14 and PMW-15	All Other Wells
First Screen Interval	Yes	Yes
Second Screen Interval	Yes	Yes
Third Screen Interval	Yes	Yes
Fourth Screen Interval	Yes	No

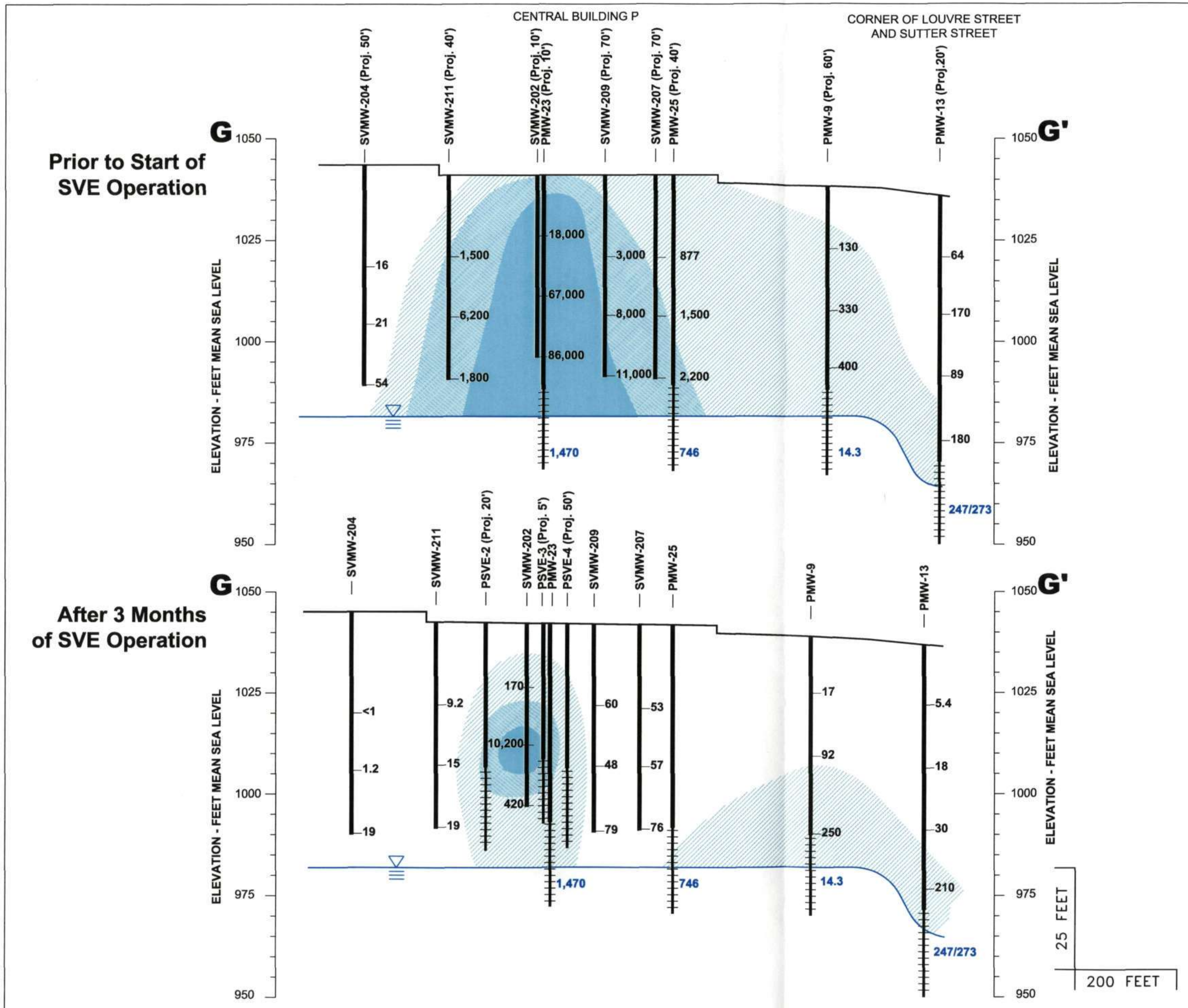
Erler & Kalinowski, Inc.

PCE Soil Gas Concentration Contours with Depth After 3 Months of SVE

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

Figure 16



Legend:

Well Screen Interval

100 to ≤ 1,000
1,000 to ≤ 10,000
≥ 10,000
} Concentration of PCE in Soil Gas, µg/L

1,500 = Concentration of PCE in Soil Gas, µg/L

1,475 = Concentration of PCE in Groundwater, µg/L

Abbreviations:

PCE = Tetrachloroethene

µg/L = micrograms per liter

SVE = Soil Vapor Extraction

Note:

1. Groundwater sampling results are for samples collected on 6 to 8 January 2003.
2. Location of the cross-section is shown on Figure 15.
3. Soil vapor extraction systems began operation in September 2002.

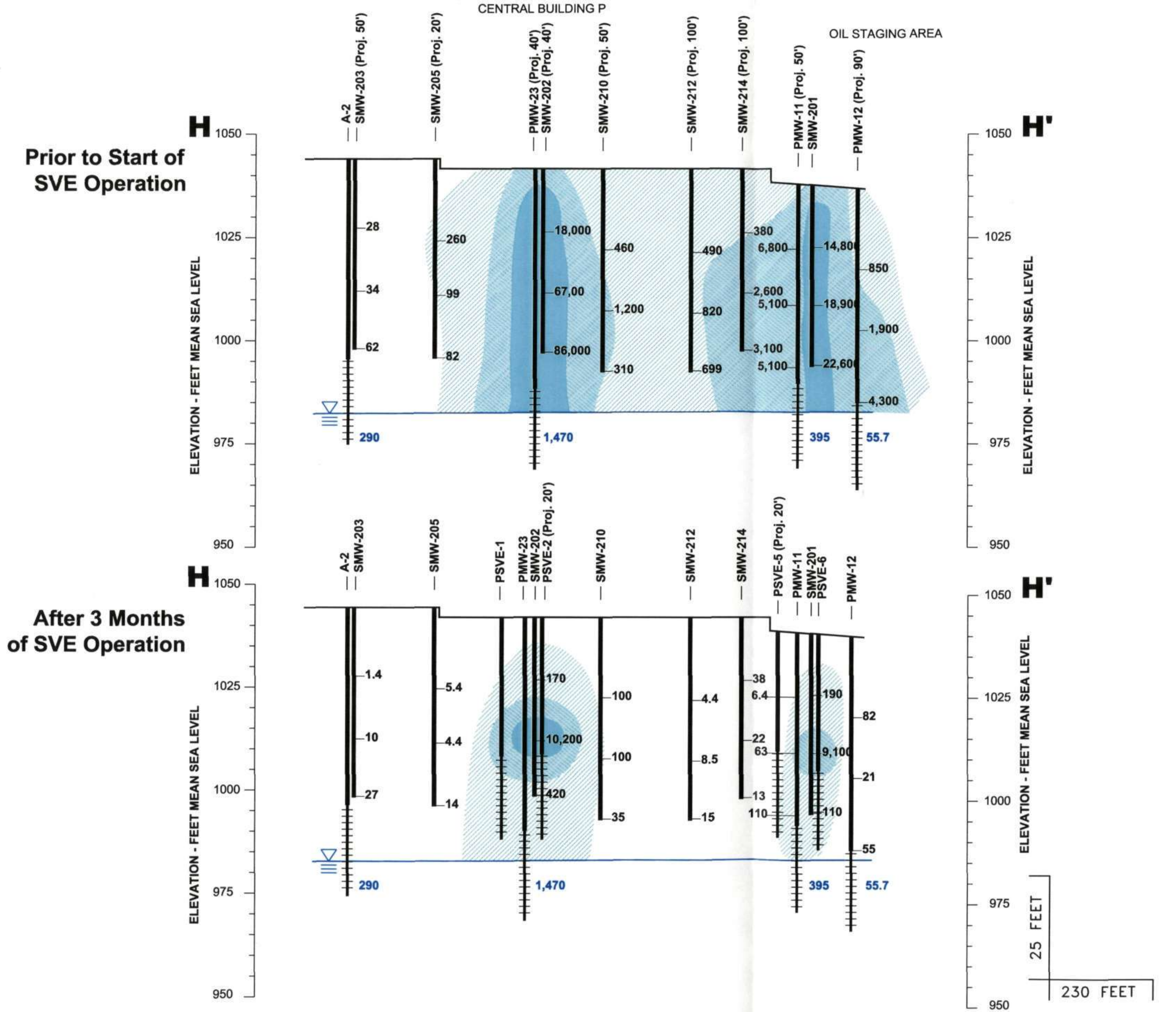
Erler & Kalinowski, Inc.

Distribution of PCE in Soil Gas Before Start and After 3 Months of SVE at Cross-Section G-G'

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

Figure 17



Legend:

Well Screen Interval

100 to ≤ 1,000
1,000 to ≤ 10,000
≥ 10,000
Concentration of PCE in Soil Gas, μg/L

400 = Concentration of PCE in Soil Gas, μg/L

1,470 = Concentration of PCE in Groundwater, μg/L

Abbreviations:

PCE = Tetrachloroethene

μg/L = micrograms per liter

SVE = Soil vapor extraction

Note:

1. Groundwater sampling results are for samples collected on 6 to 8 January 2003, except at well A-2, which is from 14 August 2002.
2. Location of the cross-section is shown on Figure 15.
3. Soil vapor extraction systems began operation in September 2002.

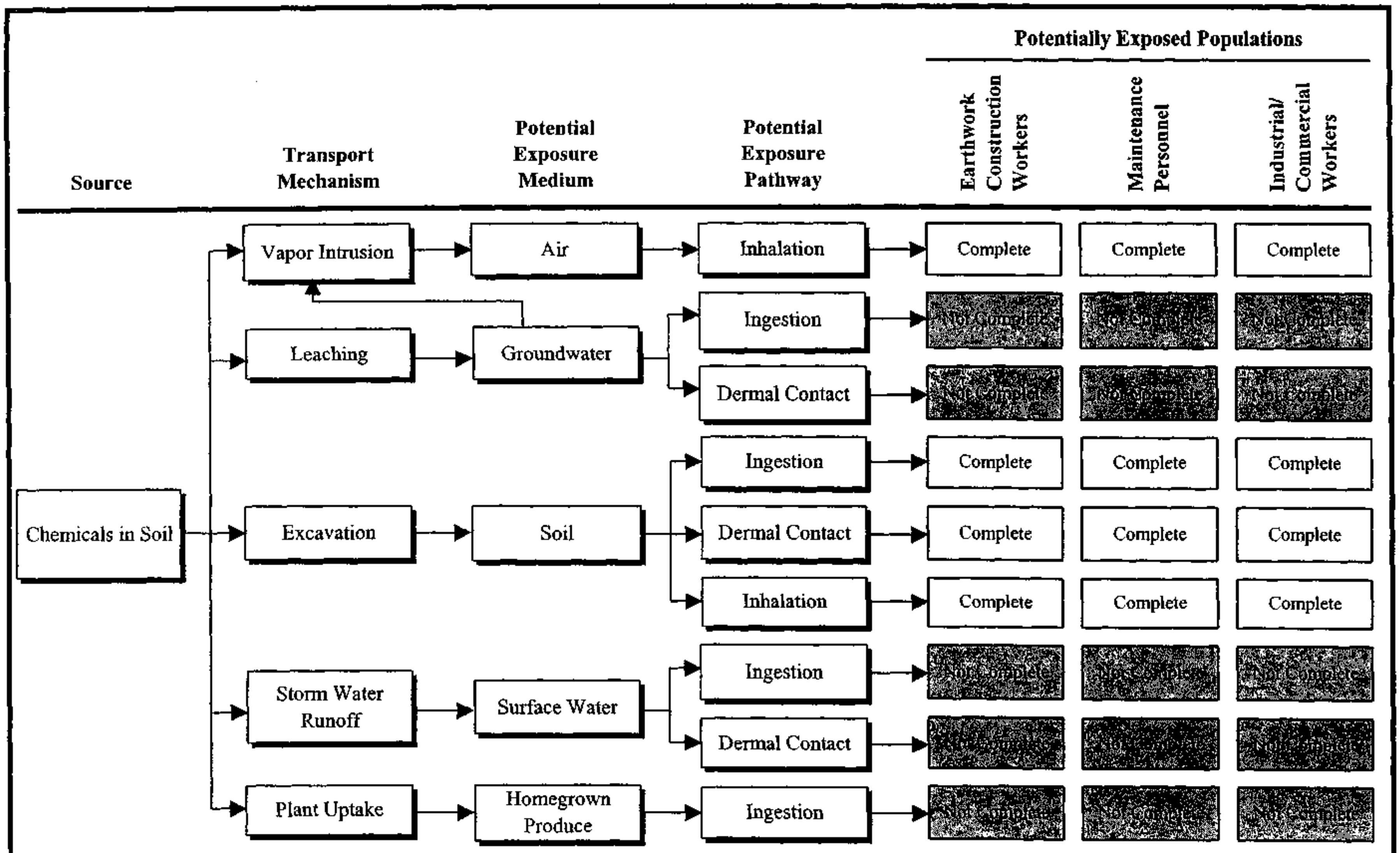
Erler & Kalinowski, Inc.

Distribution of PCE in Soil Gas Before Start and After 3 Months of SVE at Cross-Section H-H'

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

Figure 18



Potential Human Health Exposure Pathways

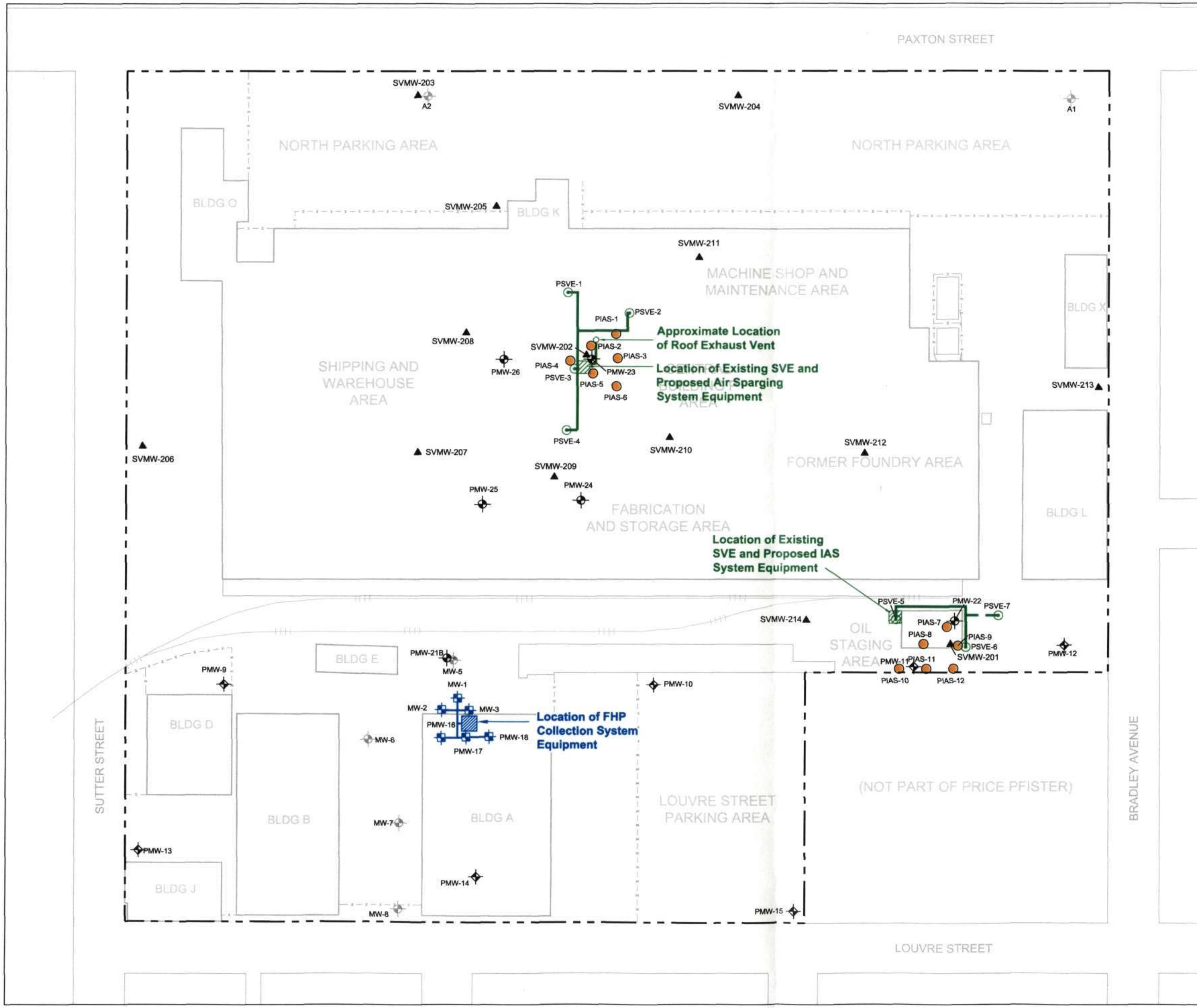
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Erler & Kalinowski, Inc.

April 2003

EKI A20034.03

Figure 19



N

0 120 240

(Approximate Scale in Feet)

Legend:

- Existing Free Hydrocarbon Product Collection Well
- Proposed In-Situ Air Sparging Well
- Existing Soil Vapor Extraction Well
- Existing Groundwater Monitoring Well
- Existing Soil Vapor Monitoring Well
- Existing Soil Vapor/Groundwater Monitoring Well
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- Existing Above-Grade SVE Piping (Overhead)
- Existing Below-Grade SVE Piping

Abbreviations:

SVE	=	Soil vapor extraction
IAS	=	In-situ air sparging
FHP	=	Free hydrocarbon product

Note:

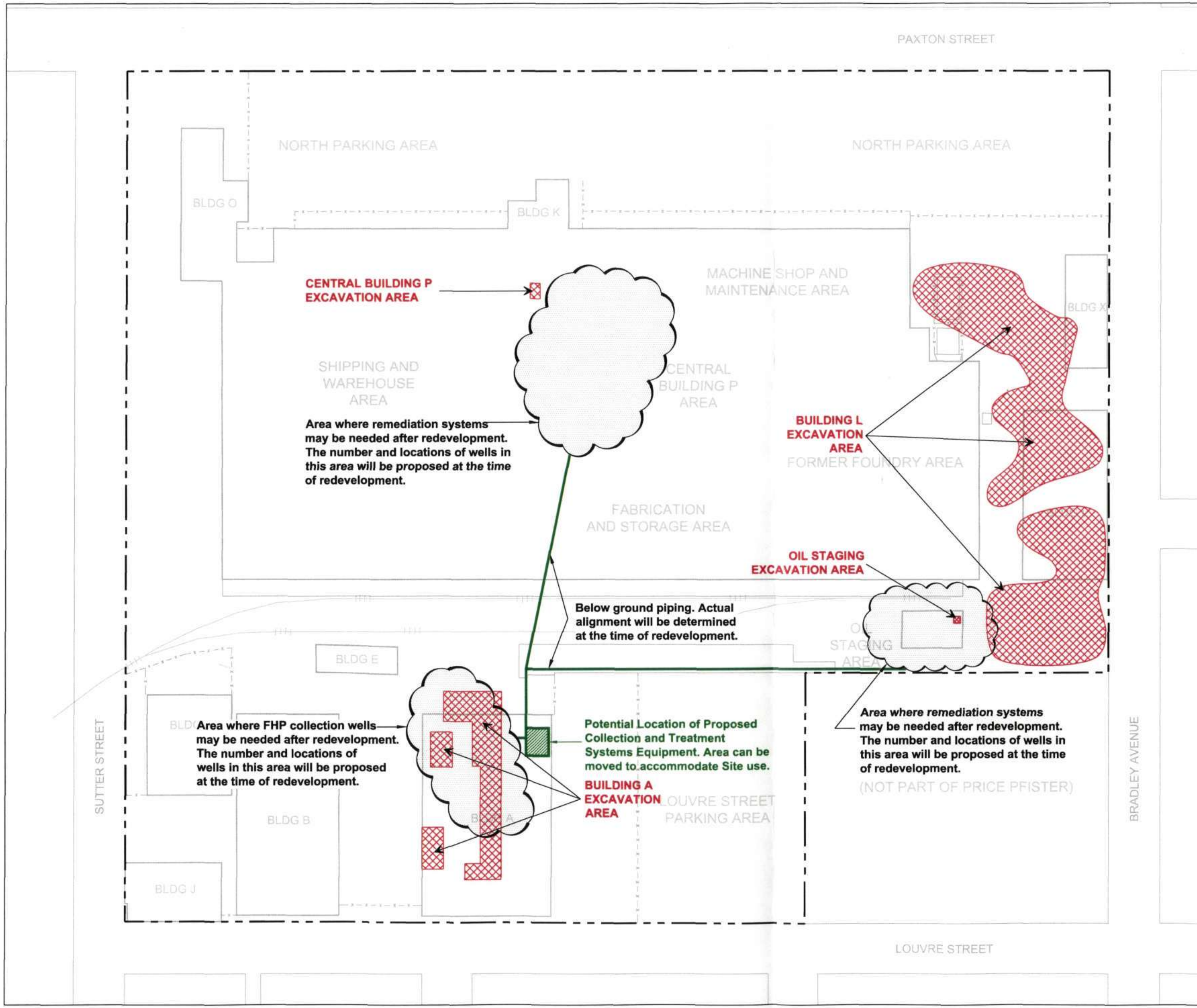
1. All locations are approximate.
2. All areas that are currently covered with concrete asphalt pavement or building must remain covered until redevelopment and are subject to the Risk Management Plan.
3. Layout of piping for in-situ sparging system will be determined prior to installation.

Erler & Kalinowski, Inc.

Layout of Current Remedial Actions

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 20



N

0 120 240
(Approximate Scale in Feet)

Legend:

- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- Below-Grade Piping
- Proposed Location of Non-VOC Sources to be Excavated (See Note 3)

Abbreviations:

SVE	=	Soil vapor extraction
IAS	=	In-situ air sparging
FHP	=	Free hydrocarbon product
VOC	=	Volatile organic compound
RAO	=	Remedial action objective

Note:

1. All locations are approximate.
2. Groundwater and vapor monitoring wells may be needed after redevelopment. The number and location of those wells will be proposed at the time of redevelopment.
3. Excavation will be performed until soil within the delineated boundaries contain non-VOCs at concentrations that achieve the RAOs, until soil is removed to a maximum of 3 feet below ground surface or adequate cover is provided to the Risk Management Plan.

Erler & Kalinowski, Inc.

Additional Remedial Actions
Contingent Upon Redevelopment

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.03

Figure 21

RISK MANAGEMENT PLAN

13500 Paxton Street, Pacoima, California

Prepared for:

Price Pfister, Inc.

25 April 2003

RISK MANAGEMENT PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

RISK MANAGEMENT PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

LIST OF TABLES

RISK MANAGEMENT PLAN

Price Pfister, Inc., Pacoima, California

CONTENTS

LIST OF FIGURES

LIST OF APPENDICES

RISK MANAGEMENT PLAN

Price Pfister, Inc., Pacoima, California

LIST OF ABBREVIATIONS AND ACRONYMS

ACM	asbestos-containing material
AOC	area of concern
Cal/EPA	State of California Environmental Protection Agency
Cal-OSHA	California Occupational Safety and Health Administration
COC	chemical of concern
cy	cubic yards
earthwork construction workers	construction workers that will conduct on-Site earthwork activities as part of redevelopment
EKI	Erler & Kalinowski, Inc.
ft bgs	feet below ground surface
H&SP	Health and Safety Plan
HI	hazard index
Holchem/Brenntag	Holchem, Inc./Brenntag West, Inc.
IAS	in-situ air sparging
industrial/commercial workers	tenants that will primarily occupy industrial and/or commercial space, and customers or other visitors that will frequent these spaces
LBP	lead-based paint
maintenance personnel	groundskeepers, utility maintenance workers, and other personnel that will maintain the improvements at the Site
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PID	photoionization detector
ppmv	part-per-million by volume

LIST OF ABBREVIATIONS AND ACRONYMS

Price Pfister	Price Pfister, Inc.
RAO	remedial action objective
RAP	Remedial Action Plan
RC	representative concentration
RMP	Risk Management Plan
RWQCB	Regional Water Quality Control Board, Los Angeles Region
SCAQMD	South Coast Air Quality Management District
Site	13500 Paxton Street, Pacoima, California
Site Owner	Owner of the Site or any portion thereof
SSD	sub-slab depressurization
SVE	soil vapor extraction
SVOC	semi-volatile organic compound
SWRCB	State Water Resources Control Board
UCL	upper confidence limit
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
WWTS	wastewater treatment system

1. OVERVIEW

Erler & Kalinowski, Inc. ("EKI") has prepared this *Risk Management Plan* ("RMP") on behalf of Price Pfister, Inc. ("Price Pfister") for the property located at 13500 Paxton Street in Pacoima, California ("Site"). The RMP is a component of the recommended remedial actions presented in the *Remedial Action Plan* ("RAP") for the Site (EKI, 2003a).

1.1 RISK MANAGEMENT PLAN OBJECTIVES

The objectives of the RMP are to provide guidance and to establish a decision framework for managing chemicals of concern ("COCs") in soil and groundwater at the Site to protect human health and the environment while accomodating planned future uses of the Site. RMP protocols allow the safe redevelopment and reuse of the Site before and after remedial actions to address COC sources have been completed. RMP protocols are also intended to protect human health and the environment from COCs that may remain after the sources at the Site are remediated, and contamination that may exist at the Site and has yet to be discovered. Finally, RMP protocols address the potential for vapor intrusion from VOCs that may continue to migrate in groundwater to the Site from nearby facilities.

1.2 RESPONSIBILITY FOR RMP IMPLEMENTATION

The owner(s) of the Site or its successors, assignees, or agents (hereinafter called "Site Owner") is responsible for ensuring the protocols set forth in the RMP are performed so human health and the environment are protected. Site Owner, without relieving its responsibility for proper performance of the RMP, may, at its sole discretion, delegate implementation of RMP protocols to tenants, contractors, or other third parties.

1.3 REPRESENTATIONS

Protocols included in this RMP are based upon EKI's current understanding of Site conditions and current policies, laws, and regulations. No representation is made to any present or future owner or developer of the Site, or their tenants, consultants, agents, or contractors as to the applicability of this RMP with respect to future Site conditions. It is intended that RMP protocols be revised, as necessary, to reflect changed environmental conditions at the Site, advances in scientific knowledge, modifications in environmental enforcement, or changed Site uses. Site Owner is therefore obligated to: (1) determine the adequacy of this RMP in light of environmental conditions actually encountered, which may differ from those understood to exist when this RMP was prepared or last revised; (2) evaluate COC health effects, to the extent scientific knowledge has changed since the RMP was prepared or last revised; (3) comply with applicable laws, regulations, and policies; and (4) determine appropriate RMP protocols if Site uses differ from those contemplated in this RMP when it was prepared or last revised.

This report is based solely upon data or information provided by Price Pfister or obtained by EKI on behalf of Price Pfister with regard to existing environmental conditions at the Site. EKI shall have no responsibility for the discovery, presence, handling, removal, disposal or exposure of persons to hazardous materials in any form at the Site. Hazardous materials are deemed to include, but not be limited to, asbestos-containing materials ("ACM"), lead-based paint ("LBP"), polychlorinated biphenyls ("PCBs"), and any other substances identified as toxic by the United States Environmental Protection Agency ("U.S. EPA") or the State of California.

1.4 INTENDED RMP USERS

This RMP is intended for various users under the direction of Site Owner. The RMP contents are presented below from the perspective of the various entities who may most often refer to the document.

Redevelopment Design Team: The RMP identifies protocols to be incorporated into the design for new industrial and/or commercial space, rehabilitation of existing buildings, and infrastructure for the Site.

Construction Workers and Maintenance Personnel: The RMP presents protocols to be implemented during construction and subsurface maintenance to mitigate potential risks to human health and the environment from these activities.

Post-Construction Site Owner and Tenants: The RMP protocols include long-term monitoring and maintenance.

2. SITE BACKGROUND

This section provides a synopsis of background information on the Site. Environmental conditions at the Site are addressed in greater detail in EKI's *Remedial Investigation Report, 13500 Paxton Street, Pacoima, California*, dated 7 February 2003, EKI's *Redevelopment Remedial Action Plan*, dated 25 April 2003, and other reports prepared for the Site.

2.1 SITE SETTING

The Site occupies approximately 25 acres and is bounded by Paxton Street to the north, Louvre Street to the south, Sutter Avenue to the west, and Bradley Avenue to the east. Figure 1 depicts the area in the vicinity of the Site. Figure 2 shows a Site plan including historical features. Several buildings occupy the Site. The remaining area is surfaced with asphalt or concrete except for small areas of landscaping around Building O. Plumbing products were manufactured at the Price Pfister property from approximately the mid-1950s to the end of 2002. As of April 2003, the only commercial operations being performed by Price Pfister at the Site relate to warehousing and shipping finished products.

2.2 SITE GEOLOGY AND HYDROGEOLOGY

Soil beneath the Site consists of sandy gravels and gravelly sands with only minor percentages of silt and clay. Groundwater is encountered at a depth of approximately 50 to 60 feet below ground surface ("ft bgs") throughout the majority of the Site and the groundwater flow direction is generally to the southeast. However, several faults, which may be potential splays of the Verdugo Fault, cause groundwater levels along the southern boundary of the Price Pfister property to drop abruptly by approximately 20 feet and the groundwater flow direction to change to the southwest near Louvre Street. Groundwater along the southern boundary of the Site is encountered at approximately 70 ft bgs.

2.3 SUMMARY OF ENVIRONMENTAL CONDITIONS AND RECOMMENDED REMEDIAL ACTIONS

COCs at the Price Pfister property consist of non-volatile organic compounds ("VOCs") in soil and VOCs in soil and groundwater. Non-VOCs are petroleum hydrocarbons as oils, metals and cyanide, and semi-volatile organic compounds ("SVOCs"). Primary VOCs include tetrachloroethene ("PCE"), 1,1,1-trichloroethane, trichloroethene, cis-1,2-dichloroethene, and 1,1-dichloroethene. Chemical releases at nearby industrial and commercial facilities have contributed significantly to VOC contamination of groundwater beneath the Site. Of particular interest is the Holchem/Brenntag West, Inc. facility ("Holchem/Brenntag"), which is in the upgradient direction of groundwater flow from the Site. The Holchem/Brenntag facility was used for storage and distribution of chemicals. Chlorinated and non-chlorinated VOCs released at the Holchem/Brenntag facility have migrated in groundwater beneath the Site.

Remedial actions were recommended in the RAP to address sources of contamination at the Central Building P Area, Building A Area, Oil Staging Area, and Building L Area, which are also referred to as areas of concern ("AOCs"). Remedial actions intended to address sources at AOCs entail the following:

- Continued operation of soil vapor extraction ("SVE") systems to remove PCE released to soil at the Central Building P Area and Oil Staging Area and addition of in-situ air sparging ("IAS") to the SVE systems to remediate PCE that migrated in soil vapor and dissolved in groundwater at these AOCs.

- Continued collection of free hydrocarbon product FHP as oils on groundwater from wells at the Building A Area.

- Excavation of non-VOC sources at the AOCs, unless final Site elevations planned as part of redevelopment call for covering the non-VOC sources with clean soil that would adequately limit direct contact with the contamination. The clarifier within the plating line and wastewater treatment system ("WWTS") at Central Building P Area will be removed, and soil will be excavated under the clarifier. Soil containing petroleum hydrocarbons as oils at Building A Area will be excavated. The containment sump at Oil Staging Area will be removed, and soil under the former sump will be excavated. Black sand and soil containing metals, petroleum hydrocarbons, and SVOCs at Building L Area will be excavated.

Figure 3 shows the layout of those remediation systems currently operated at the Site.

RMP protocols allow the safe redevelopment and reuse of the Site both before and after COC sources at the AOCs have been remediated. RMP protocols are also intended to protect human health and the environment from COCs that may remain at the AOCs after performing remedial actions and, minor contamination that may exist at other Site locations and has yet to be discovered. Finally, RMP protocols address the potential for vapor intrusion from VOCs that may continue to migrate in groundwater to the Site from Holchem/Brenntag and other nearby facilities.

3. REMEDIAL ACTION OBJECTIVES

Remedial action objectives ("RAOs") require the removal or in-situ treatment of COC sources at AOCs that have the potential to migrate in the subsurface or pose potential significant human health hazards. RAOs also require that Site Owner institute RMP protocols that protect the core users of the Site. Based on the intended future use as industrial and potential redevelopment of the Site for industrial and/or commercial uses, as allowed under Section 6.5, the primary, on-Site future populations or human receptors that may be potentially exposed to COCs in the subsurface are:

Before and After Redevelopment:

- Tenants that will primarily occupy industrial and/or commercial space, and customers or other visitors that will frequent these spaces ("industrial/commercial workers").
- Groundskeepers, utility maintenance workers, and other personnel that will maintain the improvements at the Site ("maintenance personnel").

During Redevelopment:

- Construction workers that will conduct on-Site earthwork activities as part of redevelopment ("earthwork construction workers").

Figure 4 identifies the complete or potentially complete exposure pathways for these on-Site populations. As depicted on Figure 4, inhalation of VOCs by vapor intrusion is the only potentially complete exposure pathway for industrial/commercial workers given the requirement in Section 4.4 that the entire Site remain covered. Direct contact with contaminated soil through ingestion, dermal contact, and inhalation are the potentially complete exposure pathways for earthwork construction workers and maintenance personnel. To protect core Site users, remedial actions specific to AOCs and RMP protocols must limit hypothetical risks associated with potentially complete exposure pathways to the following:

- Cumulative hazard index ("HI") equal to or less than 1 for non-carcinogenic COCs
- Cumulative incremental lifetime cancer risk equal to or less than 10^{-5} for potential carcinogenic COCs

- Blood lead concentration equal to or less than 10 micrograms per deciliter due to both naturally occurring lead and lead at the Site as calculated by the State of California Environmental Protection Agency ("Cal/EPA"), Department of Toxic Substances Control DTSC Lead Spread Version 7.0 computer model.

Remediation goals presented in Table 1 are intended to assist with determining when remedial actions and RMP protocols have met the above target risk levels. However, use of remediation goals is not compulsory and it may not be possible or necessary to attain them.

Upon implementing remedial actions or RMP protocols that involve removal of contaminated soil, non-VOC concentrations will be compared to the remediation goals in Table 1 that correspond to the depth intervals where COCs remain in the subsurface. Removal of contaminated soil at the Site may not achieve individual remediation goals. It may be inevitable that residual non-VOCs concentrations at some locations will be greater than individual remediation goals. Under such circumstances, removal of non-VOCs will be judged complete when the human health remediation goal for lead is achieved and residual concentrations of other COCs in soil no longer pose hypothetical risks to potentially exposed individuals that are greater than a cumulative HI of 1 and a cumulative incremental lifetime cancer risk of 10^{-5}.

Besides meeting non-carcinogen and carcinogen target risk levels for vapor intrusion and direct contact exposure pathways, remedial actions and RMP protocols for VOCs and hexavalent chromium must be designed to achieve groundwater protection remediation goals. The remediation goals for VOCs and hexavalent chromium in Table 1 that must be achieved are therefore the lowest values that protect both human health and do not result in further groundwater degradation. Remediation goals for VOCs are expressed in soil and soil gas concentrations. Implemented remedial actions and RMP protocols can be determined to be complete based upon the analytical results of either soil or soil gas samples.

Representative concentrations ("RCs") of non-VOCs detected in soil, and VOCs detected in soil or soil gas at the location in question will be compared to the remediation goals in Table 1. RCs will be based upon appropriate arithmetic or geometric mean values, the 95% upper confidence limits on the appropriate means, or the maximum COC concentrations detected at the location in question. The maximum detected COC concentrations can be used as the RCs when there are insufficient data points.

In lieu of using the human health remediation goals in Table 1, cumulative HIs and cancer risks of residual COCs may be calculated after removing or treating contaminated soil to ensure that residual COCs in soil and soil gas are not present at concentrations that exceed target risk levels. Formulas for calculating cumulative HIs and cancer risks at a location in question are presented in Appendix A. Remedial actions or RMP protocols implemented to meet target risk levels must strive to achieve groundwater protection remediation goals presented in Table 1 before implemented remedial actions or RMP protocols can be determined to be complete.

4. DESIGN PROTOCOLS

This section describes RMP protocols to be considered in the design of buildings and other improvements as part of Site redevelopment. Site Owner shall incorporate appropriate RMP protocols for protection of human health and the environment into technical specifications of contract documents for design of buildings and other improvements at the Site.

4.1 PROTOCOLS FOR IDENTIFIED SOURCES OF NON-VOCS

Unless final Site elevations planned as part of redevelopment call for covering the non-VOC sources with clean soil that would adequately limit direct contact with the contamination, the RAP requires Site Owner to excavate non-VOC sources in soil at the AOCs when access is gained during redevelopment by demolishing existing structures covering these sources. The delineated boundaries where non-VOC sources are to be excavated at the AOCs are shown on Figures 5 through 9. Excavation will be performed until soil within the delineated boundaries contains non-VOCs at concentrations that achieve the RAOs or until soil is removed to a maximum depth of 3 ft bgs and the lateral limits of required excavation have been attained. Excavation is limited to the upper 3 feet of the Site because shallow soil is the material most likely to be contacted by maintenance workers or other individuals (e.g., gardeners, plumbers, electricians) that are not likely to be appropriately health and safety trained.

Lateral excavation beyond the delineated boundaries of non-VOC sources does not have to be performed if soil outside the boundaries remains undisturbed and cover requirements specified in Section 4.4 are met. Earthwork (e.g., grading, foundation construction, utility trench excavation) that will disturb soil contaminated with non-VOCs must be conducted in a manner that prevents spreading of contamination and allows RAOs to be achieved. Consequently, earthwork may necessitate excavating and disposing of greater quantities of contaminated soil at an off-Site, permitted waste management facility than otherwise required by the RAP.

4.2 PROTOCOLS FOR IDENTIFIED SOURCES OF VOCS

VOC sources in soil at the Central Building P Area and Oil Staging Area are being remediated by SVE. The RAP requires that SVE in combination with IAS be performed until the RAOs are achieved, asymptotic VOC concentrations in soil gas are attained, or operation of the SVE and IAS systems must be halted to allow redevelopment of the Site to proceed.

VOCs may remain a concern after completing SVE and IAS with new construction because VOCs are emanating in groundwater from the Holchem/Brenntag facility and possibly other nearby facilities. New construction must meet current energy standards and will be significantly more airtight than the existing structures. Large doors on most of the existing buildings were kept open throughout the period that historical manufacturing operations took place at the Site. Until VOC sources at the Holchem/Brenntag facility and elsewhere are remediated or controlled, VOCs in groundwater will continue to be transported to the Site where VOCs can volatilize from groundwater and migrate through soil gas into air inside buildings at the Site. This mechanism is referred to as vapor intrusion. Vapor intrusion is typically assumed to occur through building foundation cracks or gaps caused by penetrations through the building foundation.

Site Owner shall evaluate the potential risks of vapor intrusion prior to occupying existing buildings, or designing and constructing new buildings at the Site. At a minimum, Site Owner will implement measures to safeguard building tenants if Site Owner determines that vapor intrusion may result in hypothetical risks greater than the target risk levels adopted as RAOs (Section 3) for the Site. Measures to reduce vapor intrusion may include, but are not limited to, installation of sub-slab depressurization ("SSD") systems, SVE systems, low-permeability covers, and/or use of mechanical devices and flexible sealants to fill cracks, expansion joints, or gaps around utility penetrations in building foundations. Site Owner shall be responsible for inspecting and maintaining any measures implemented to reduce vapor intrusion as necessary.

4.3 PROTOCOLS FOR NEWLY DISCOVERED CONTAMINATION

Although it is believed that all significant sources of non-VOCs and VOCs will be remediated by excavation and SVE/IAS, undiscovered soil contamination may exist at other Site locations. Consequently, Site Owner shall keep the entire Site covered, as specified in Section 4.4, and shall inspect soil for evidence of potential contamination when performing subsurface activities, as discussed in Section 5.4.

Soil outside of the delineated boundaries of non-VOC sources must be removed only to the extent necessary to accommodate construction or prevent spreading of contamination during earthwork. Soil contaminated with non-VOCs that is beyond the vertical or lateral limits of earthwork (e.g., graded area, foundation footprint, utility trench alignment) does not have to be excavated if cover requirements are met. Before filling the excavation, Site Owner shall place a marker over any contaminated soil that remains. The marker will consist of brightly colored plastic mesh, geotextile, or similar material that does not impede surface water infiltration and will not degrade appreciably over time. The marker placed in the excavation will serve as a physical indicator that contaminated soil is present and only individuals that are appropriately health and safety trained can conduct earthwork activities at the marked location. Site Owner shall also implement a notification system (e.g., posted signs and/or use of an underground dig alert service) such that a contractor, tenant, or other party planning subsurface work at the Site informs Site Owner of the planned work. Upon receiving notification that subsurface work is planned, Site Owner shall properly instruct personnel conducting the work of environmental conditions at the Site and RMP protocols to be followed, and monitor the work as it is performed.

Cover requirements described in Section 4.4 may not provide adequate containment of VOCs because VOCs are mobile in the subsurface and may migrate in soil gas to groundwater or into air inside buildings. Site Owner shall either excavate soil that contains VOCs at concentrations greater than remediation goals in Table 1 or control potential vapor migration from such soil by installing and operating SSD or SVE systems, or implementing other equally effective measures.

4.4 COVER REQUIREMENTS

Site Owner shall maintain existing cover over the entire Site until it is replaced with new buildings or other improvements constructed as part of redevelopment of the Site. Site Owner shall also maintain new cover at the Site. Existing or new cover will prevent exposure to non-VOC sources at the AOCs and undiscovered contamination that might exist at other Site locations. Acceptable cover materials include building foundations, asphalt, concrete pavement, or three (3) feet of clean soil. Existing soil that is not contaminated will satisfy the requirement for 3 feet of clean soil. Reuse of Site soil is discussed in Section 5.4.1, and protocols for monitoring soil for VOCs and inspecting soil for indicators of potential contamination are specified in Sections 5.4.2 and 5.4.3.

5. CONSTRUCTION PROTOCOLS

This section describes RMP protocols to be implemented during construction (e.g., demolition, excavation, grading, and building construction) to mitigate potential risks to human health and the environment. In general, these RMP protocols are not needed for construction activities that do not involve handling of soil. Site Owner is responsible for ensuring that the RMP protocols described in this section are performed during activities to which they apply.

5.1 HEALTH AND SAFETY REQUIREMENTS

Each contractor whose work may involve handling of or contact with hazardous wastes, hazardous materials, or contaminated soil at the Site must prepare its own Site-specific health and safety plan ("H&SP"). Each H&SP must conform to State of California Occupational Safety and Health Administration ("Cal-OSHA") standards for hazardous waste operations promulgated in Section 5192 of Title 8 of the California Code of Regulations CCR, and any other applicable health and safety standards. Each H&SP must, at a minimum, include descriptions of health and safety training requirements for on-Site earthwork construction workers, personal protective equipment to be used, and any other applicable precautions to be undertaken to minimize direct contact with hazardous wastes, hazardous materials, and contaminated soil.

The contractor preparing the Site-specific H&SP must verify that the components of the H&SP are consistent with applicable Cal-OSHA occupational health and safety standards and currently available toxicological information. Each contractor must require its employees to perform all activities in accordance with the contractor's H&SP. The contractor must ensure that its workers at the Site have the appropriate level of health and safety training and that these workers use the appropriate personal protective equipment, as specified in the H&SP.

5.2 ACM, LBP, PCB, AND DEMOLITION DEBRIS PROTOCOLS

Existing buildings were surveyed for ACM and LBP in 2002. The results of these surveys are summarized in Forensic Analytical's *Pre-Demolition Asbestos Survey Report* and *Pre-Demolition Limited Lead-Based Paint Survey Report*, both dated 15 July 2002. PCB-containing equipment (e.g., capacitors, transformers that provided power to a furnace in

Building A) employed in manufacturing operations has been removed. No PCBs have been detected in soil or on building surfaces that have been analyzed for PCBs (EKI, 2003b). Fluorescent light ballasts remaining at the Site may contain PCBs. In addition, transformers adjacent to the switching station, east of Building P may contain PCBs. The City of Los Angeles Department of Water and Power owns and operates these transformers. Site Owner must test for, notify tenants and workers of the presence, and abate, as necessary, ACM, LBP, and PCBs in accordance with applicable laws and regulations.

Site Owner shall also comply with applicable laws and regulations pertaining to the abatement and management of ACM, LBP, and PCBs in connection with demolition of buildings and other improvements at the Site. Site Owner shall assess building components and pavement for possible contamination (e.g., metal or oil impregnated concrete or COC-containing soil adhered to pavement) and manage such debris and waste resulting from demolition so as to avoid contaminating portions of the Site that are not presently contaminated or have been remediated. Site Owner shall recycle or dispose of demolition debris and waste in accordance with applicable laws and regulations. Site Owner shall consult the remedial investigation report and other pertinent information on environmental conditions and historical manufacturing operations at the Site to identify building components and pavement that, in the judgment of Site Owner, should be assessed for possible contamination.

5.3 EARTHWORK PROTOCOLS

RMP protocols to be performed during earthwork include, but are not limited to, the following:

- Implementation of dust control measures.
- Decontamination of construction equipment and transportation vehicles.
- Implementation of storm water pollution controls.

These earthwork mitigation measures are discussed in Sections 5.3.1 through 5.3.3.

5.3.1 Dust Control Measures

Site Owner must ensure that dust control measures are performed during construction activities at the Site to minimize dust generation. It is particularly important to minimize the exposure of individuals at the Site to dust containing COCs, and to prevent dust from migrating off the Site. Dust generation may be associated with excavation activities, truck traffic, wind traversing uncovered soil stockpiles, loading of transportation vehicles, or other earthwork activities. If required, Site Owner must ensure that a fugitive dust control plan is prepared and submitted to the South Coast Air Quality Management District ("SCAQMD") in accordance with SCAQMD Rule 403. Dust control measures at the Site may include the following:

- Misting or spraying water on the Site prior to initiating any earth-moving or excavation activities, and at regular and frequent intervals during the aforementioned activities, and during loading of transportation vehicles.
- Installing temporary coverings or applying water on stockpiles generated as a result of excavating soil.
- Limiting vehicle speeds to minimize dust generation.
- Suspending all grading and excavation activities during periods of high wind (e.g., instantaneous gusts greater than 25 miles per hour).
- Minimizing drop heights while loading transportation vehicles, and covering or maintaining at least two feet of freeboard (i.e., minimum vertical distance between top of load and top of trailer) on trucks hauling dirt, sand, soil, or other loose materials on public streets.
- Controlling to the greatest extent feasible any intensive dust generating activity, such as abrasive blasting, drilling or grading; such controls are specific to the activity, but can include the use of screens or enclosures, water sprays, or collection devices such as vacuums.

5.3.2 Decontamination of Construction Equipment and Transportation Vehicles

To minimize tracking of potentially contaminated soil onto roadways, the Site Owner must ensure that all construction equipment and transportation vehicles that contacts contaminated soil must be decontaminated prior to leaving the Site. Decontamination methods can include scraping, brushing, or vacuuming to remove dirt on vehicle wheels, buckets, and exteriors. In the event that these dry decontamination methods are not adequate, methods such as steam cleaning, high-pressure washing, and cleaning solutions must be used, as necessary, to thoroughly remove accumulated dirt and other materials. Wash water resulting from decontamination activities must be collected and managed in accordance with applicable laws and regulations.

5.3.3 Storm Water Pollution Controls

Site Owner shall implement storm water pollution controls to minimize runoff of sediment and storm water that has contacted COC-containing soil. If required, Site Owner shall file a notice of intent to comply with Cal/EPA, State Water Resources Control Board ("SWRCB") General Permit and Waste Discharge Requirements for Discharges of Storm Water Runoff Associated with Construction Activity (SWRCB Order No. 99-08-DWQ, dated 19 August 1999, or as amended or revised as of the date construction work commences). Site Owner shall also prepare and implement a storm water pollution prevention plan, as necessary.

5.4 SOIL INSPECTION AND TESTING PROTOCOLS

Site Owner shall follow RMP protocols specified in Sections 5.4.1 through 5.4.4 whenever managing soil at the Site.

5.4.1 Reuse of Site Soil

Soil that is located outside the delineated boundaries of non-VOC sources at the AOCs and has no indicators of contamination (Section 5.4.3) can be reused without sampling the soil for COCs. Soil that is excavated from within the delineated boundaries of non-VOC sources or has indicators of potential contamination may not be reused on-Site unless sampling, as specified in Section 5.4.4, establishes that this soil does not contain COCs at concentrations greater than remediation goals. Site Owner shall dispose of contaminated soil that cannot be reused at an off-Site, permitted waste management facility.

5.4.2 SCAQMD Rule 1166 Monitoring for VOCs

Site Owner shall comply with SCAQMD Rule 1166 when excavating soil that contains VOCs. According to SCAQMD Rule 1166, Site Owner must apply for and obtain a Site-specific Rule 116 Contaminated Soil Mitigation Plan. During earthwork activities, Site Owner shall screen soil with a photoionization detector ("PID") at a frequency of every half-hour for each 30 cubic yard ("cy") of soil. Monitoring will conform to procedures in SCAQMD Rule 1166 and will include performing PID measurements at a distance of no more than 3 inches above the soil.

The soil is considered to be "VOC-contaminated" if the PID measures 50 part-per-million by volume ("ppmv") or greater and SCAQMD must be notified pursuant to SCAQMD

Rule 1166. If the PID measures between 50 and 1,000 ppmv, SCAQMD Rule 1166 requires that soil in the affected location be sprayed with water or treated with vapor suppressant. If the PID measures greater than 1,000 ppmv, water or a suppressant must be applied to control emanation of vapors from soil being excavated. Impacted soil also must be placed in sealed containers or covered with plastic sheeting, and subsequently transported for disposal at an off-Site, permitted waste management facility.

5.4.3 Inspection of Soil for Indicators of Potential Contamination

Upon removing cover materials or subsurface structures (e.g., sanitary sewer pipelines, sumps, catch basins) that may have historically contained or leaked hazardous materials, Site Owner shall inspect underlying and surrounding exposed soil for evidence of staining, discoloration, sheens, oils, and noticeable solvent- or petroleum hydrocarbon-like odors. Soil displaying any indicator of potential contamination shall be sampled and tested as described in Section 5.4.4. Work at the location in question shall be suspended until the analytical results of soil samples are obtained. Soil found to be contaminated must be managed as outlined in Section 4.3 by individuals that are appropriately health and safety trained.

5.4.4 Soil Sample Collection and Analytical Procedures

Site Owner shall collect soil samples from locations where soil is known to contain COCs (i.e., delineated boundaries of non-VOC sources as shown on Figures 5 through 9) or is found to have indicators of potential contamination. Soil samples shall be collected at the frequencies listed below that correspond to the situations under which contaminated soil is encountered at the Site:

- For excavations **less than** 3 ft bgs that are within delineated boundaries of non-VOC sources or where an indicator of potential contamination is observed, a minimum of one representative soil sample will be collected every 2,500 square feet of visibly stained or odorous soil from the floor of the excavation.
- For excavations **equal to or deeper than** 3 ft bgs that are within delineated boundaries of non-VOC sources or where an indicator of potential contamination is observed, a minimum of one representative soil sample will be collected every 2,500 square feet of visibly stained or odorous soil from the floor and each sidewall of the excavation.
- For excavations involving pipelines or other elongated subsurface structures, a minimum of one representative soil sample will be collected every 100 linear feet of

visibly stained or odorous soil beneath the segment of pipeline or subsurface structure removed.

- For stockpiles of soil excavated from delineated boundaries of non-VOC sources or locations where an indicator of potential contamination is observed, a minimum of one representative soil sample will be collected every 50 cy of soil from stockpiles less than 200 cy. For stockpiles larger than 200 cy, a minimum of one representative soil sample may be collected every 200 cy of soil. To collect representative stockpile soil samples, the volume of soil within each stockpile, at any given time, will be estimated based on either the estimated volume of the equipment used to handle the materials (e.g., counting backhoe bucket loads) or measurements of the stockpile dimensions and height. Stockpiles will be divided into approximately 50 cy sections by means of flagging or other suitable marking device. Each 50 cy section will be uniquely labeled for subsequent identification. A maximum of four discrete samples will be collected from random locations throughout each 50 cy section and combined to form one representative sample. If more that 200 cy is stockpiled from the same excavation, then the representative samples to be analyzed will be composites of soil samples collected from the four 50 cy sections that comprise each 200 cy of the stockpile.

Soil samples shall be collected so the loss of VOCs is minimized and sample cross-contamination is avoided. A sample label will be attached to each sample container and will include a unique sample identification number, and the time and date the sample was collected. Sealed sample containers will be placed in a cooled container for temporary storage and the container will be transported to the analytical laboratory following chain-of-custody procedures. Soil samples will be analyzed for the following COCs by U.S. EPA approved methods:

- VOCs
- Total chromium, hexavalent chromium, copper, lead, nickel, and zinc
- Total extractable petroleum hydrocarbons

In addition to the above COCs, soil samples suspected to contain black sand or to otherwise have contamination associated with historical foundry operations at the Site will be analyzed for SVOCs. Soil samples obtained from locations within the former plating line and WWTS of Central Building P must be analyzed for cyanide in addition to the above COCs.

5.5 SUBSURFACE STRUCTURE AND UNDERGROUND PIPE PROTOCOLS

The ten underground storage tanks ("USTs") known to have existed at the Site have been removed. Figure 2 depicts the approximate locations of the former USTs and locations of other known subsurface structures or pipes that may have historically contained or leaked hazardous materials.

If any below-grade structure is encountered during construction activities, Site Owner shall notify Cal/EPA, Regional Water Quality Control Board, Los Angeles Region ("RWQCB") and City of Los Angeles Fire Department as required by applicable laws and regulations. Site Owner shall remove any liquid or sludge from the structure, if feasible, and place the liquid and sludge in an appropriate container. The liquid or sludge, if any, will be tested for hazardous constituents and disposed at an appropriate off-Site, permitted waste management facility. If all or a portion of the subsurface structure or pipe is removed for construction, it will also be disposed at an appropriate off-Site, permitted waste management facility in accordance with applicable laws and regulations. Any soil with indicators of potential contamination surrounding the subsurface structure or pipe will be managed according to the protocols described in Section 5.4.3.

5.6 SOIL IMPORT PROTOCOLS

Site Owner shall ensure that soil imported to the Site contains COCs at concentrations that are less than the remediation goals in Table 1 and otherwise achieve RAOs. Such procedures may include conducting a visit to the proposed fill source, reviewing available environmental site assessment reports and laboratory analytical results associated with the proposed fill source, and collecting and analyzing soil samples for the presence of COCs and other contaminants (e.g., pesticides or herbicides).

5.7 PROTECTION OF REMEDIATION SYSTEMS

Figure 3 shows the layout of those remediation systems currently operating at the Site. Site Owner shall locate all monitoring wells and other components (e.g., pipelines, electrical conduits, treatment equipment) of remediation systems before starting demolition and construction at the Site. If monitoring wells and other remediation system components are not to be removed during redevelopment, Site Owner will mark monitoring wells and the other components that are to remain with brightly painted steel pipes or bollards. The markers will extend above ground not less than four feet, such that they are easily visible.

Construction activities will be performed with hand tools within two feet of monitoring wells or other remediation system components. In the event that subsurface pipelines or conduit are exposed, steel plate will be placed over the utilities or equivalent protective measures will be employed until the utilities are reburied.

5.8 DOCUMENTATION

Site Owner shall document the testing, removal, and disposal of soil and other waste containing hazardous materials or substances. This documentation will include any field notes, photographs, laboratory analytical reports, plans and written summaries that may be required by RWQCB or other regulatory agency. Findings from such documentation will be used to update or amend this RMP, as appropriate.

6. POST-CONSTRUCTION PROTOCOLS

Site Owner shall perform future activities in ways that minimize potential exposure to COC-containing soil and groundwater at the Site.

6.1 PROTOCOLS FOR FUTURE SUBSURFACE ACTIVITIES

Site Owner shall require that each contractor with employees who may be exposed to contaminated soil as a result of removing the cover (e.g., for utility repairs, work on building foundations, or changes to paved areas) prepare a Site-specific H&SP, as described in Section 5.1. Individuals engaged in subsurface activities or may otherwise be exposed to COCs in soil must follow the procedures in the H&SP. If untrained health and safety workers encounter contaminated soil or indicators of potential contamination, then work must stop in that location and be completed by appropriately health and safety trained individuals.

If disturbance of covered soil is planned, the work must follow the construction protocols outlined in Section 5. Soil can be replaced in the excavation or used elsewhere on the Site, provided the soil does not contain COCs at concentrations greater than remediation goals. Site Owner shall dispose of contaminated soil that cannot be reused at an off-Site, permitted waste management facility.

6.2 PROTOCOLS FOR ENTERING SUBSURFACE STRUCTURES

Workers entering subsurface structures (e.g., utility vaults) where VOCs might accumulate must follow procedures to assess air quality within the subsurface structures before entering the structures. In addition to standard procedures for confined space entry, workers must evaluate whether VOCs have accumulated in the structure. Such evaluation can include sampling the air within the structure with a real-time organic vapor meter or by collecting air samples for laboratory analysis of VOCs. Specific health and safety procedures for entering and working in subsurface structures must be described in the H&SP prepared for this work.

6.3 MAINTENANCE

Site Owner shall inspect the Site to determine if cover materials have been damaged or disturbed to the extent that covered soils have or are likely to become exposed. Site Owner shall conduct these inspections every two years, at a minimum, to verify that cover materials are effectively preventing exposure to underlying soil. Any observed damage to or disturbance of the cover must be repaired promptly. Site Owner must summarize the findings of each inspection in a written report. The report will describe the steps taken to repair damaged cover materials, and if possible, steps taken to prevent future damage or disturbance. Site Owner shall also monitor and maintain any measures implemented to prevent vapor intrusion of VOCs inside buildings at the Site

6.4 PROHIBITION OF USE OF SITE GROUNDWATER

Use of groundwater beneath the Site for potable supply or other purposes is prohibited until COC concentrations in groundwater are less than maximum contaminant levels or as otherwise approved by RWQCB.

6.5 FUTURE LAND USE

The Site is planned for industrial and/or commercial redevelopment. Prohibited uses under the planned redevelopment include residential housing, schools, day care facilities, nursing homes, hospitals and any other institutions where children, elderly or infirm would be present for extended periods of time. Industrial and/or commercial land use of the Site will not change without RWQCB and other regulatory agencies exercising jurisdiction at the Site having the opportunity to review and, if necessary, revise the RMP based upon the proposed new land use.

7. REFERENCES

EKI. 25 April 2003a. *Redevelopment Remedial Action Plan, Price Pfister, Inc, 13500 Paxton Street, Pacoima, California.*

EKI. 7 February 2003b. *Remedial Investigation Report, Price Pfister, Inc, 13500 Paxton Street, Pacoima, California.*

Forensic Analytical. 15 July 2002a. *Pre-Demolition Asbestos Survey Report.*

Forensic Analytical. 15 July 2002b. *Pre-Demolition Limited Lead-Base Paint Survey Report.*

Table 1

Remediation Goals for Chemicals of Concern in Soil

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goal (1)		Human Health Remediation Goal (2)	
		Soil (mg/kg)	Soil Gas (µg/L) (3)	Soil (mg/kg)	Soil Gas (µg/L) (3)
VOCs					
Primary VOCs					
Tetrachloroethene	0 - 3	3.7	5,200	0.28	380
	3 - 30	0.045	63	0.031	43
	30 - 60	0.011	15	0.028	38
1,1,1-trichloroethane	0 - 3	69	89,000	290	370,000
	3 - 30	0.85	1,100	65	83,000
	30 - 60	0.21	270	58	75,000
Trichloroethene	0 - 3	2.85	4,700	0.72	1,200
	3 - 30	0.036	60	0.091	150
	30 - 60	0.0088	14	0.082	130
cis-1,2-dichloroethene	0 - 3	2.4	4,100	16	27,000
	3 - 30	0.043	73	2.3	3,900
	30 - 60	0.0094	16	2.0	3,500
1,1-dichloroethene	0 - 3	1.3	5,500	16	65,000
	3 - 30	0.016	68	4.5	19,000
	30 - 60	0.0043	18	4.1	17,000
Secondary VOCs					
1,1-dichloroethane	0 - 3	1.7	3,800	1.0	2,200
	3 - 30	0.028	61	0.11	250
	30 - 60	0.0062	14	0.10	220
1,2-dichloroethane	0 - 3	0.168	370	0.078	170
	3 - 30	0.0080	18	0.0086	19
	30 - 60	0.0014	3.0	0.0078	17
trans-1,2-dichloroethene	0 - 3	3.6	9,500	22	56,000
	3 - 30	0.048	120	4.5	12,000
	30 - 60	0.012	33	4.1	11,000
Vinyl Chloride	0 - 3	0.089	430	0.021	100
	3 - 30	0.0011	5.4	0.0023	10
	30 - 60	0.00030	1.5	0.0021	10
Bromomethane	0 - 3	2.5	7,100	1.4	4,200
	3 - 30	0.037	110	0.32	940
	30 - 60	0.0085	25	0.29	840
Chloroform	0 - 3	31.86	48,000	0.31	470
	3 - 30	0.571	860	0.034	52
	30 - 60	0.133	200	0.031	47
Trichlorofluoromethane	0 - 3	77	98,000	240	310,000
	3 - 30	0.96	1,200	45	58,000
	30 - 60	0.12	150	41	52,000

Table 1

Remediation Goals for Chemicals of Concern in Soil

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goal (1) Soil (mg/kg)	Groundwater Protection Remediation Goal (1) Soil Gas (μg/L) (3)	Human Health Remediation Goal (2) Soil (mg/kg)	Human Health Remediation Goal (2) Soil Gas (μg/L) (3)
VOCs					
Secondary VOCs					
Benzene	0 - 3	0.43	770	0.057	100
	3 - 30	0.0064	11	0.0064	11
	30 - 60	0.0015	2.7	0.0057	10
Toluene	0 - 3	120	130,000	160	180,000
	3 - 30	1.6	1,700	19	21,000
	30 - 60	0.38	420	17	19,000
Ethylbenzene	0 - 3	52	40,000	52	40,000
	3 - 30	11	8,500	52	40,000
	30 - 60	2.6	2,000	52	40,000
Total Xylenes	0 - 3	58	30,000	58	30,000
	3 - 30	30	16,000	45	24,000
	30 - 60	7.1	3,700	41	21,000
Non-VOCs					
Petroleum Hydrocarbons					
Total Extractable Petroleum Hydrocarbons	0 - 3	--	--	1,000	--
	3 - 30	--	--	1,000	--
	30 - 60	--	--	1,000	--
Metals and Cyanide					
Chromium	0 - 3	--	--	1,900	--
	3 - 30	--	--	1,900	--
	30 - 60	--	--	1,900	--
Hexavalent Chromium	0 - 3	7.6	--	270	--
	3 - 30	1.1	--	270	--
	30 - 60	0.99	--	270	--
Copper	0 - 3	--	--	7,700	--
	3 - 30	--	--	7,700	--
	30 - 60	--	--	7,700	--
Lead	0 - 3	--	--	740	--
	3 - 30	--	--	740	--
	30 - 60	--	--	740	--
Nickel	0 - 3	--	--	3,700	--
	3 - 30	--	--	3,700	--
	30 - 60	--	--	3,700	--
Zinc	0 - 3	--	--	63,000	--
	3 - 30	--	--	63,000	--
	30 - 60	--	--	63,000	--

Table 1

Remediation Goals for Chemicals of Concern in Soil

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goal (1)		Human Health Remediation Goal (2)	
		Soil (mg/kg)	Soil Gas (µg/L) (3)	Soil (mg/kg)	Soil Gas (µg/L) (3)
Non-VOCs					
Metals and Cyanide					
Cyanide	0 - 3	4,200	--	4,200	--
	3 - 30	4,200	--	4,200	--
	30 - 60	4,200	--	4,200	--
Semi-Volatile Organic Compounds					
Chrysene	0 - 10	1,000,000	11,000	14	0.15
	10 - 35	21,000	220	14	0.15
	35 - 60	330	3.5	14	0.15
Phenanthrene	0 - 10	1,000,000	8,600	37,000	320
	10 - 35	1,000,000	8,600	37,000	320
	35 - 60	30,000	260	37,000	320
Pyrene	0 - 10	1,000,000	4,700	4,300	20
	10 - 35	880,000	4,100	4,300	20
	35 - 60	1,900	8.9	4,300	20

Abbreviations

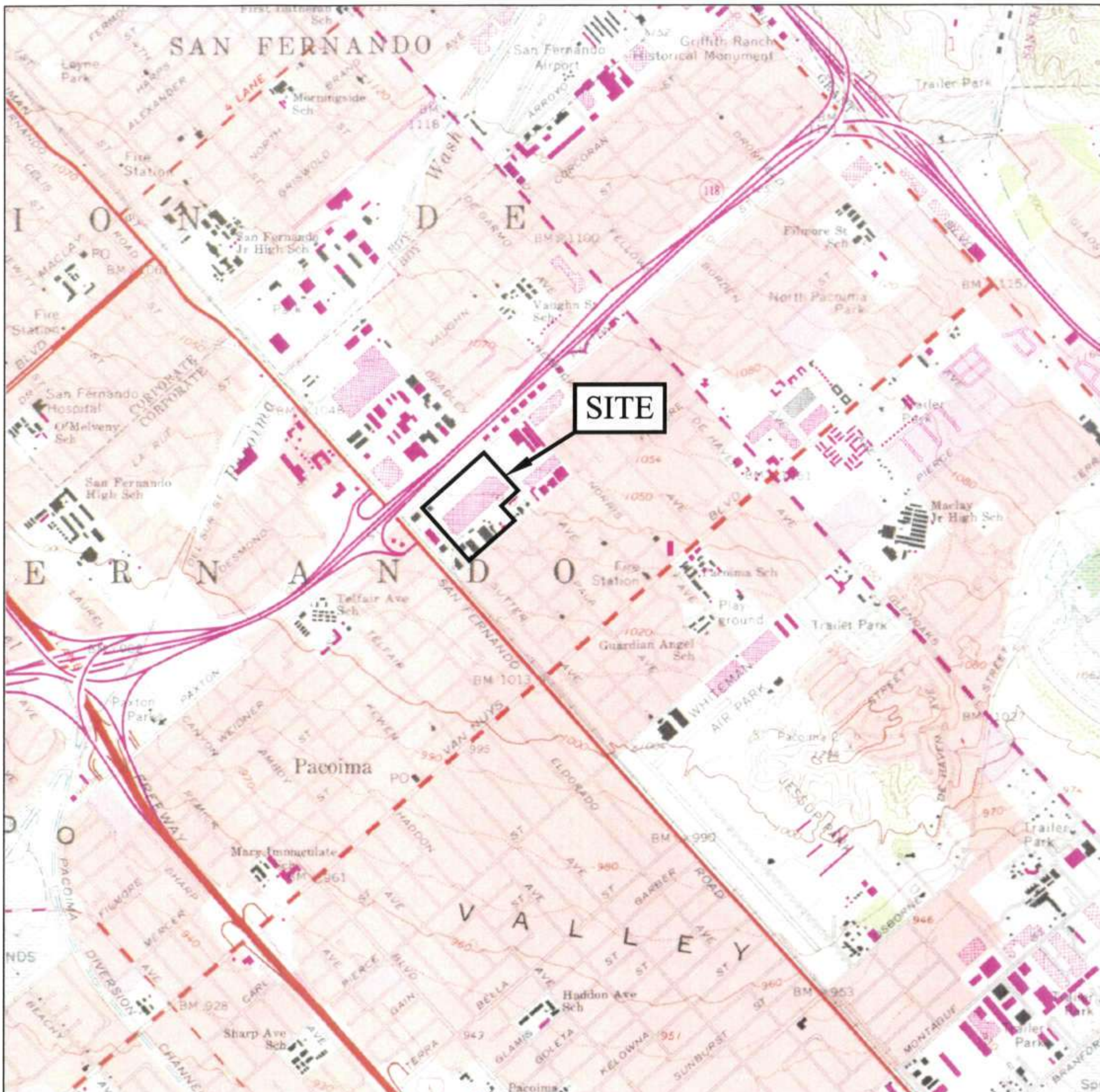
-- not calculated
ft bgs feet below ground surface
mg/kg milligrams per kilogram
µg/L micrograms per liter
SVOC semi-volatile organic compound
VOC volatile organic compound

Notes

(1) Groundwater protection remediation gaols are VOC and hexavalent chromium concentrations in soil that are calculated not to result in VOC and hexavalent chromium concentrations in groundwater that are greater than relevant maximum contaminant levels or preliminary remediation goals. Groundwater protection remediation goals are required only for VOCs and hexavalent chromium because other metals, SVOCs, and petroleum hydrocarbons as oils remaining in soil at the Site are not prone to leaching or migrating as vapor to groundwater.

(2) Human health remediation goals listed are the chemical concentrations that are protective of all identified potentially exposed populations and potentially complete exposure pathways.

(3) Listed soil gas concentrations for VOCs and SVOCs are those calculated to be in equilibrium with the given soil concentrations for VOCs and SVOCs. Soil gas concentrations are listed only for those chemicals determined to be volatile.



Reference: U.S.G.S. 7.5 Minute Series Topographic Map, "San Fernando" Quadrangle, 1966 photorevised 1988.

Note:

1. All locations are approximate.

N

0 2000 4000

(Approximate Scale in Feet)

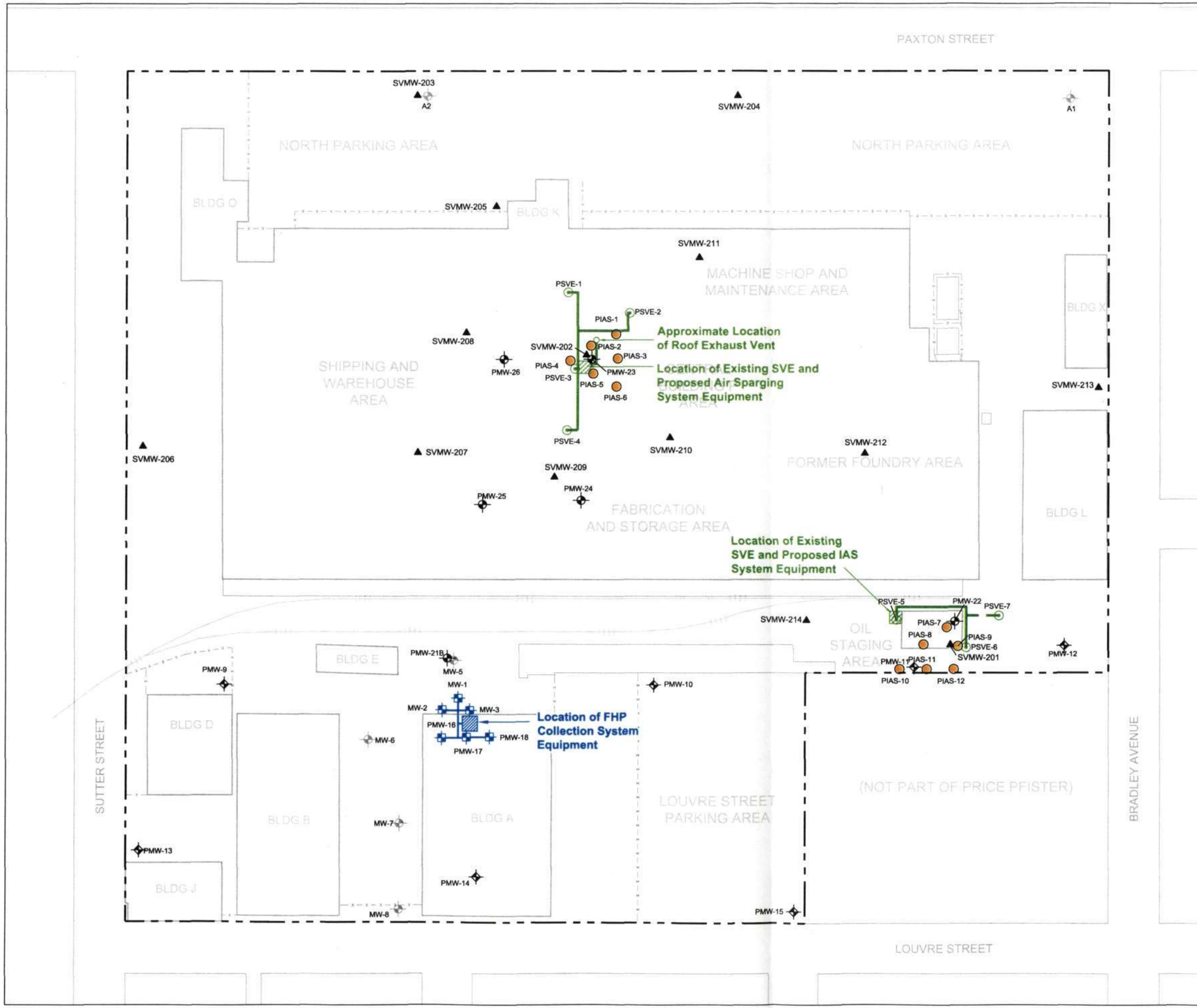
Erler & Kalinowski, Inc.

Site Vicinity Map

Price Pfister, Inc.
Pacoima, CA

April 2003
A20034.03

Figure 1



Legend:

- Existing Free Hydrocarbon Product Collection Well
- Proposed In-Situ Air Sparging Well
- Existing Soil Vapor Extraction Well
- Existing Groundwater Monitoring Well
- Existing Soil Vapor Monitoring Well
- Existing Soil Vapor/Groundwater Monitoring Well
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- Existing Above-Grade SVE Piping (Overhead)
- Existing Below-Grade SVE Piping

Abbreviations:

SVE	=	Soil Vapor Extraction
IAS	=	In Situ Air Sparging
FHP	=	Free Hydrocarbon Product

Note:

1. All locations are approximate.
2. All areas that are currently covered with concrete asphalt pavement or building must remain covered until redevelopment and are subject to the Risk Management Plan.
3. Layout of piping for in-situ sparging system will be determined prior to installation.

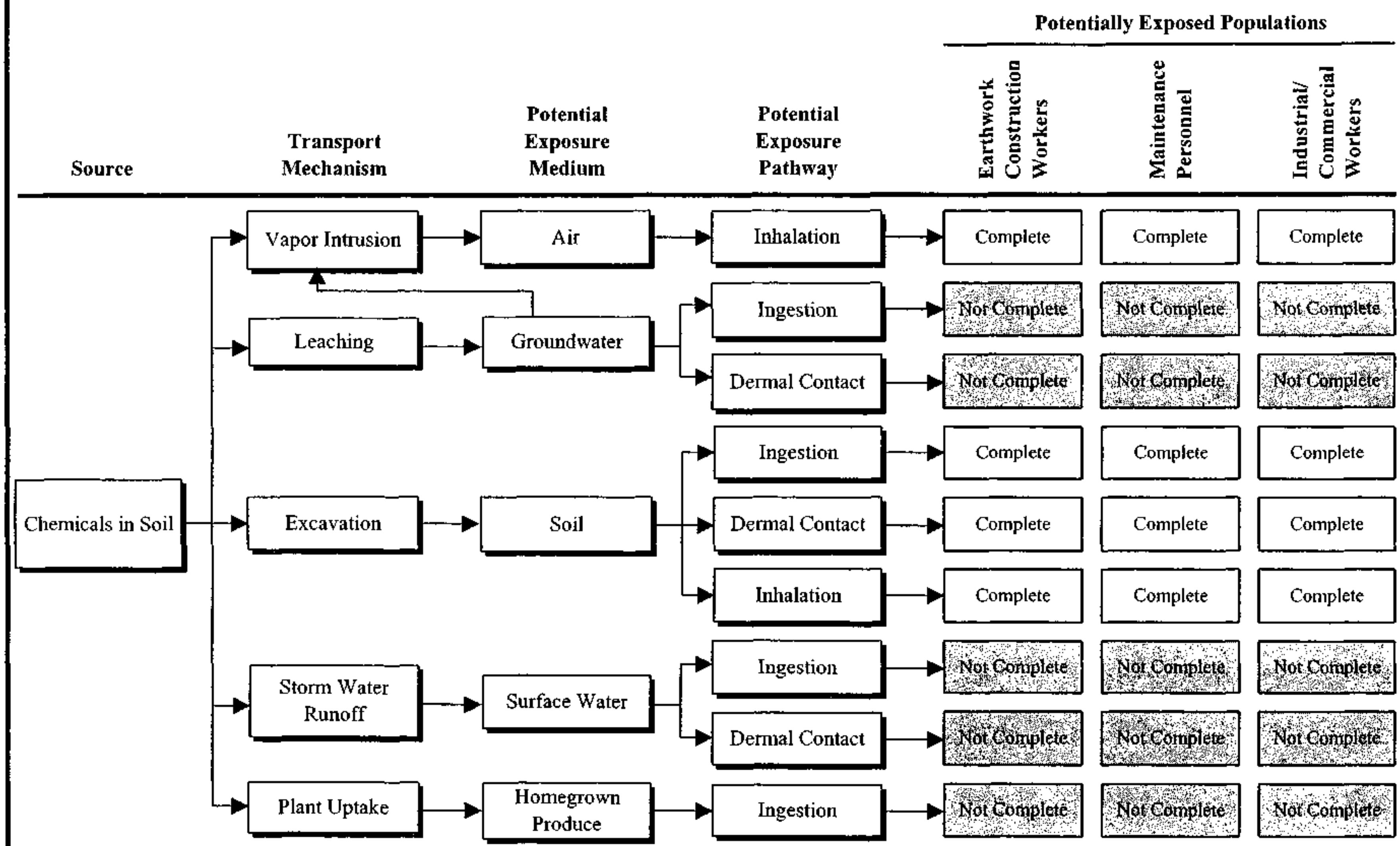
Erler & Kalinowski, Inc.

Current Remedial Actions and Well Locations

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

Figure 3



Potential Human Health Exposure Pathways

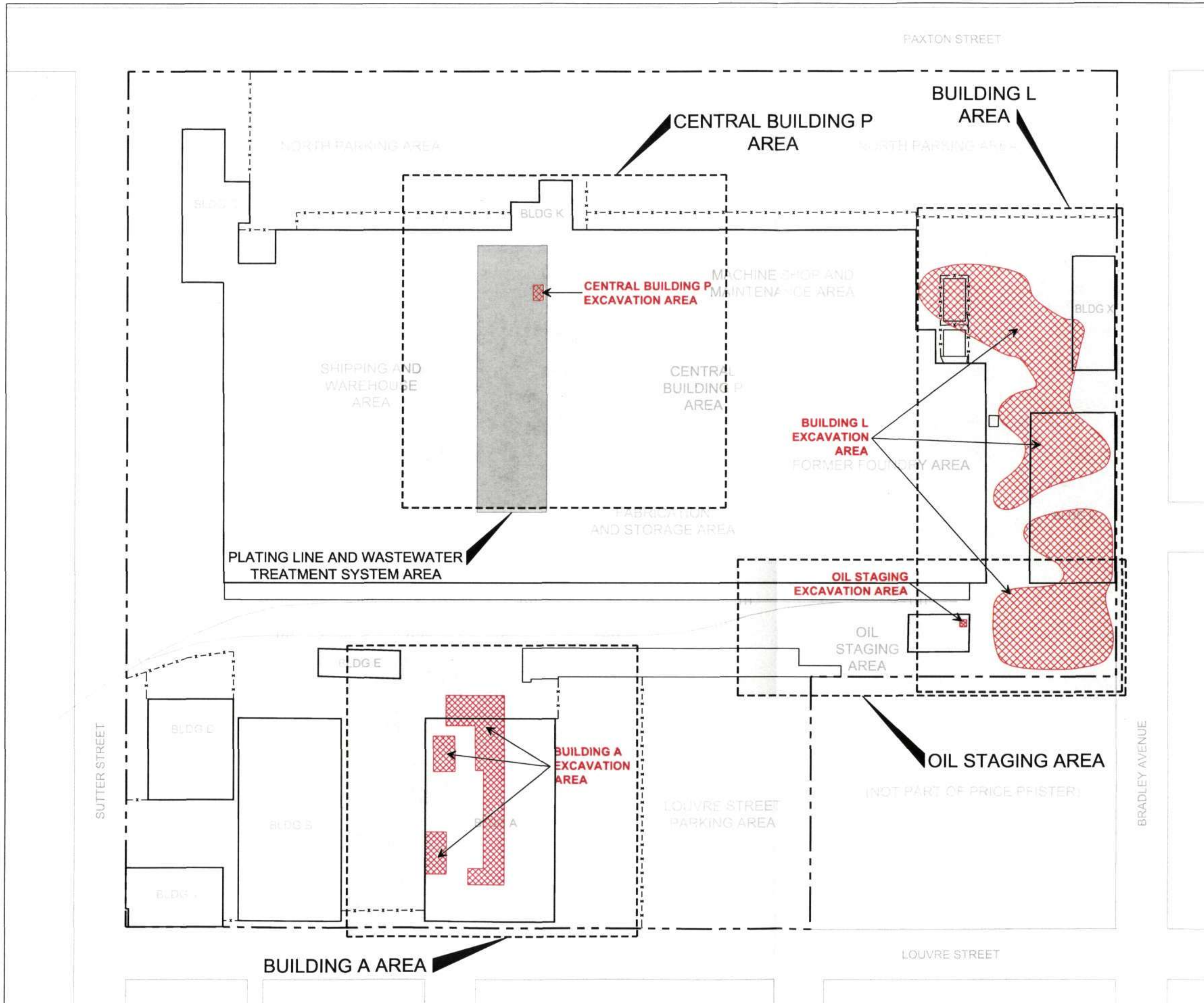
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Erler & Kalinowski, Inc.

April 2003

EKI A20034.03

Figure 4



N

0 120 240

(Approximate Scale in Feet)

Legend:

- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- Delineated Boundaries of Non-VOC Sources to be Excavated (See Note 2)

Abbreviations:

VOC = Volatile organic compound
RAO = Remedial action objective

Note:

1. All locations are approximate.
2. Excavation will be performed until soil within the delineated boundaries contain non-VOCs at concentrations that achieve the RAOs, until soil is removed to a maximum of 3 feet below ground surface or adequate cover is provided pursuant to the Risk Management Plan.
3. See Figures 6 through 9 for planned soil excavation in each area of concern.

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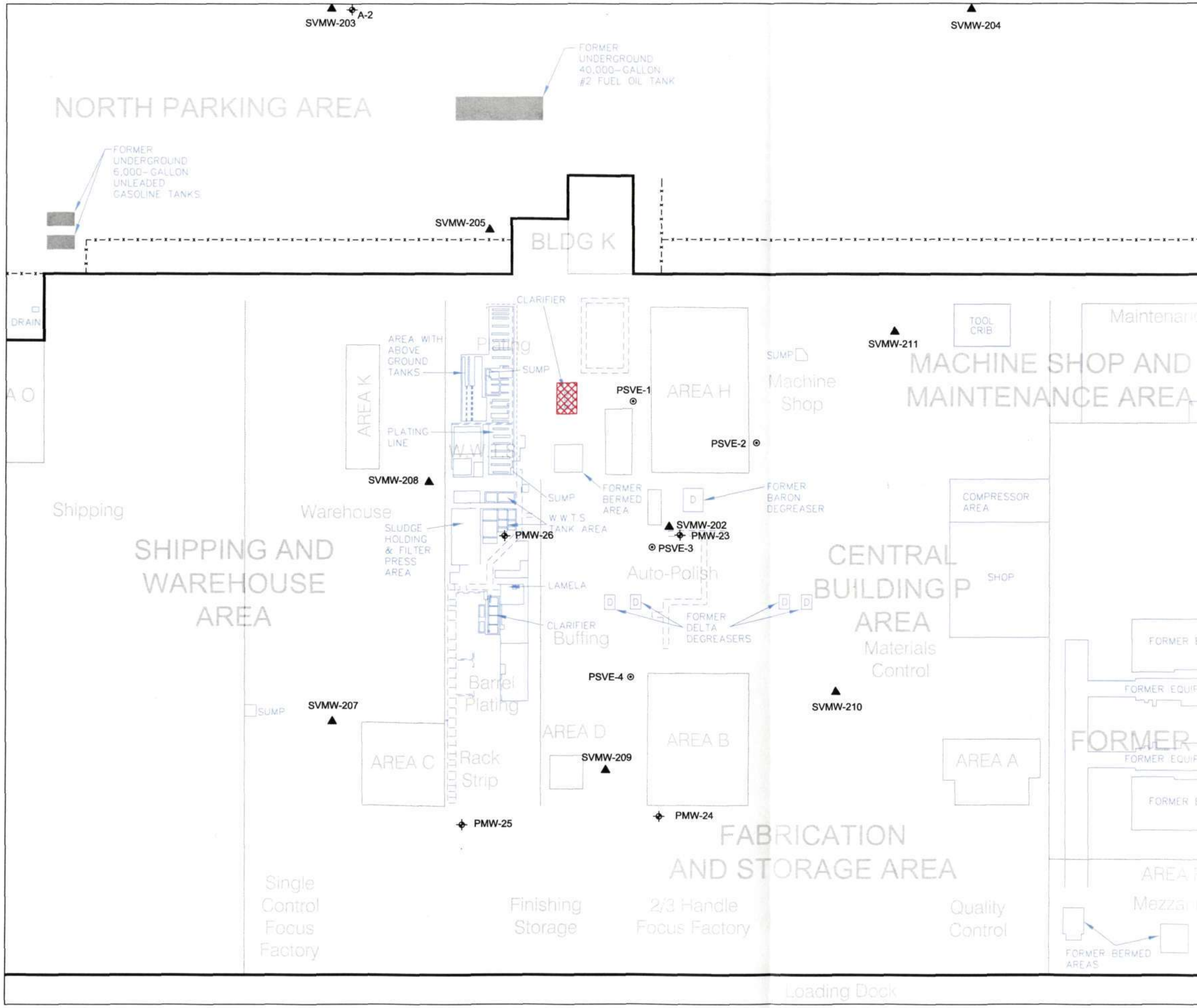
Extent of Proposed Soil Excavation

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.03

Figure 5



N

0 60 120

(Approximate Scale in Feet)

Legend:

- ▲ Soil Vapor Monitoring Well
- ⊙ Soil Vapor Extraction Well
- ✦ Soil Vapor / Groundwater Monitoring Well
- Former Above Ground or Underground Storage Tank or Process Unit
- Existing Interior Wall or Office
- Out-of-Service Railroad Spur
- Fence
- Former or Existing Trench
- Delineated Boundary of Non-VOC Source to be Excavated (See Note 2)

Abbreviations:

VOC = Volatile organic compound
RAO = Remedial action objective

Notes:

1. All locations are approximate.
2. Excavation will be performed until soil within the delineated boundaries contain non-VOCs at concentrations that achieve the RAOs, until soil is removed to a maximum of 3 feet below ground surface or adequate cover is provided pursuant to the Risk Management Plan.

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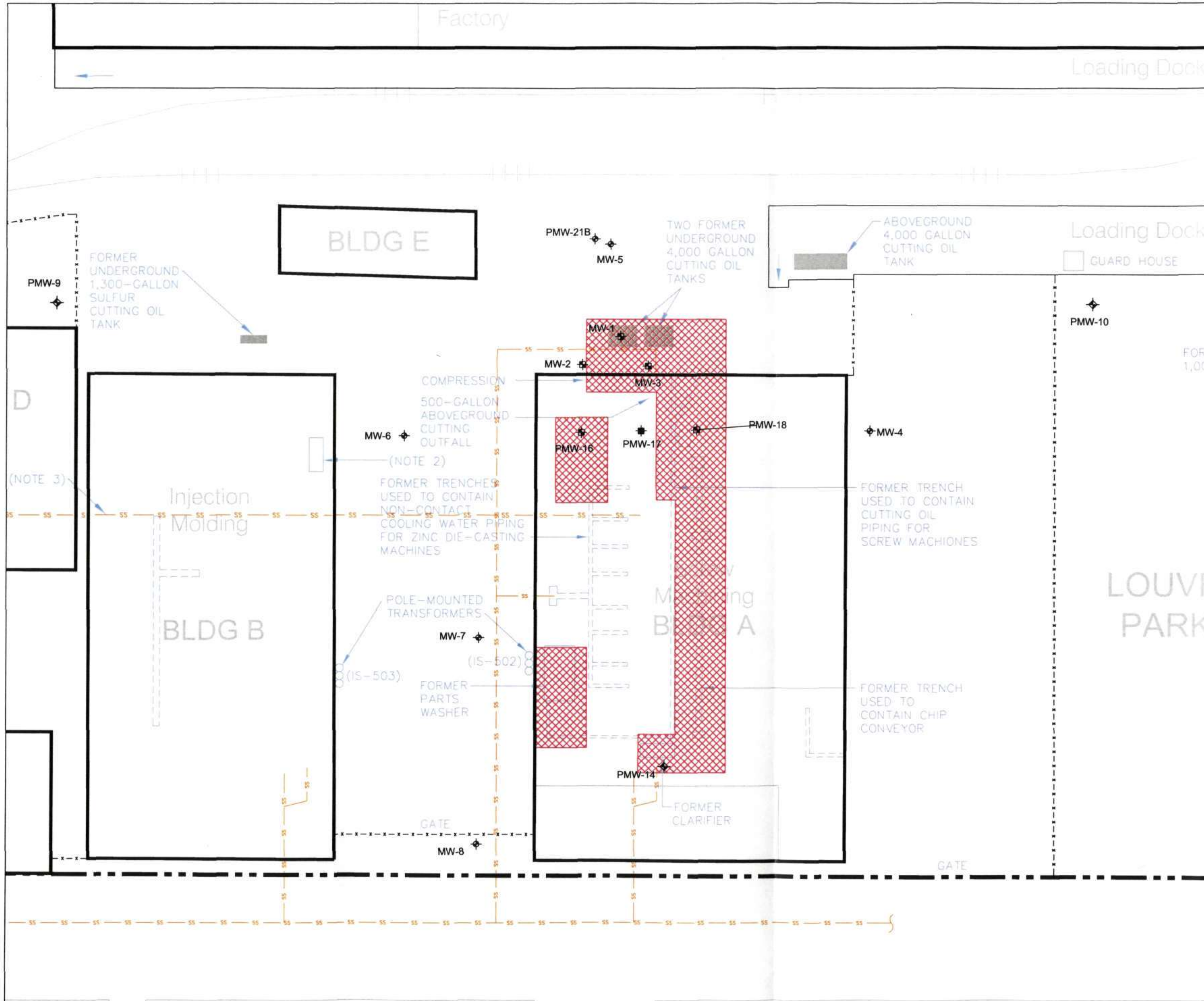
Extent of Proposed Soil Excavation at Central Building P Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.09

Figure 6



N

0 50 100

(Approximate Scale in Feet)

Legend:

- Free Hydrocarbon Product Collection Well
- Groundwater Monitoring Well
- Soil Vapor/Groundwater Monitoring Well
- Soil Vapor Monitoring/Free Hydrocarbon Product Collection Well
- Former Aboveground or Underground Storage Tank or Process Unit
- Existing Interior Wall or Office
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- Former or Existing Trench
- Existing Sanitary Sewer Line
- Delineated Boundary of Non-VOC Source to be Excavated (See Note 3)

Abbreviations:

VOC = Volatile organic compound

RAO = Remedial action objective

Notes:

1. All locations are approximate.
2. Locations of sewer lines shown may be significantly different than actual locations.
3. Excavation will be performed until soil within the delineated boundaries contain non-VOCs at concentrations that achieve the RAOs, until soil is removed to a maximum of 3 feet below ground surface or adequate cover is provided pursuant to the Risk Management Plan.

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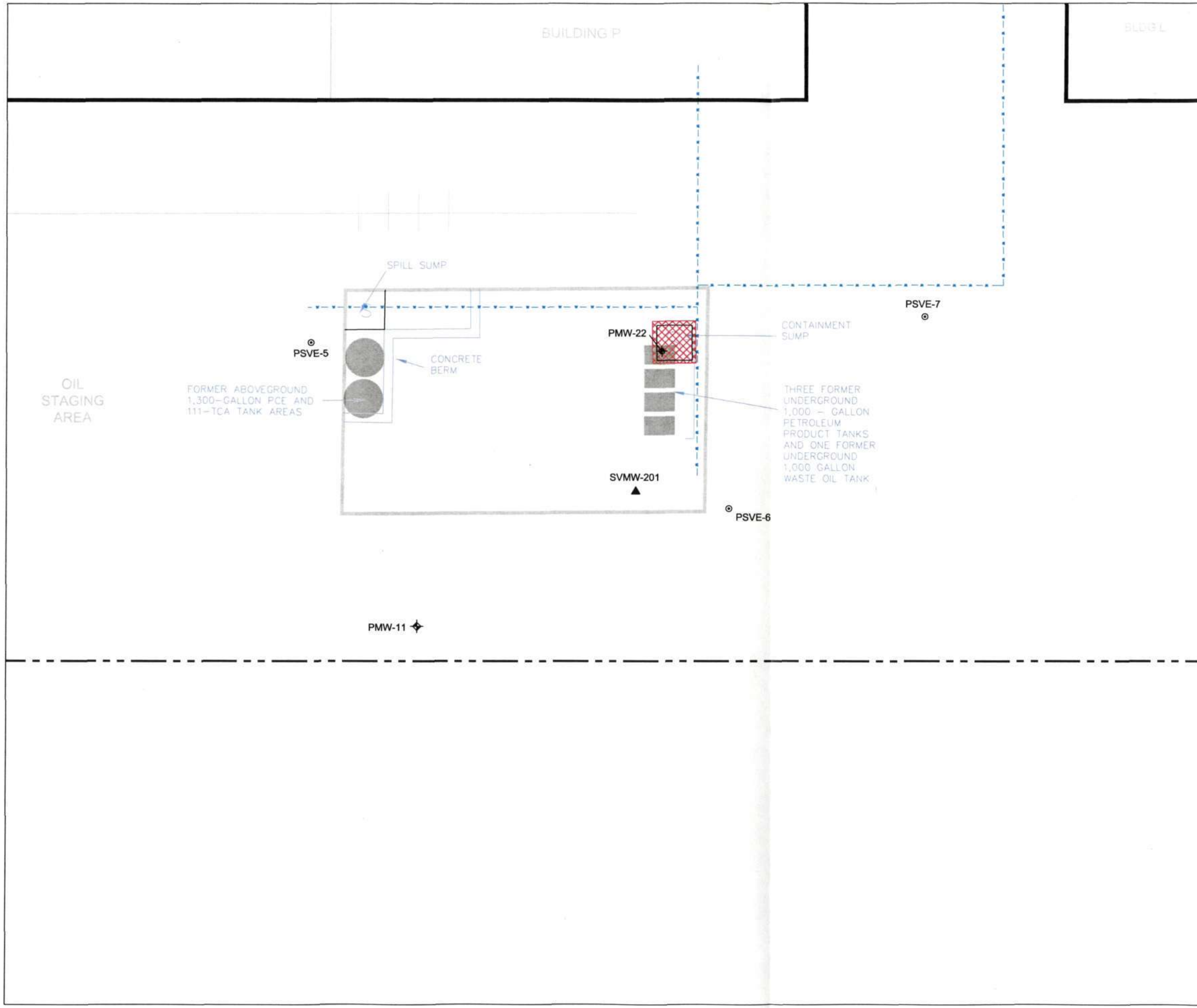
Extent of Proposed Soil Excavation at Building A Area

Price Pfister, Inc.
Pacoima, CA

April 2003
EKI A20034.09

Figure 7



N

0 20 40
(Approximate Scale in Feet)

Legend:

- ▲ Soil Vapor Monitoring Well
- ⊙ Soil Vapor Extraction Well
- Groundwater Monitoring Well
- Soil Vapor/Groundwater Monitoring Well
- Former Above Ground or Underground Storage Tank or Process Unit
- Existing Interior Wall or Office
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Former or Existing Trench
- Water Line
- Delineated Boundary of Non-VOC Source to be Excavated (See Note 2)

Abbreviations:

VOC = Volatile organic compound
RAO = Remedial action objective

Notes:

1. All locations are approximate.
2. Excavation will be performed until soil within the delineated boundaries contain non-VOCs at concentrations that achieve the RAOs, until soil is removed to a maximum of 3 feet below ground surface or adequate cover is provided pursuant to the Risk Management Plan.

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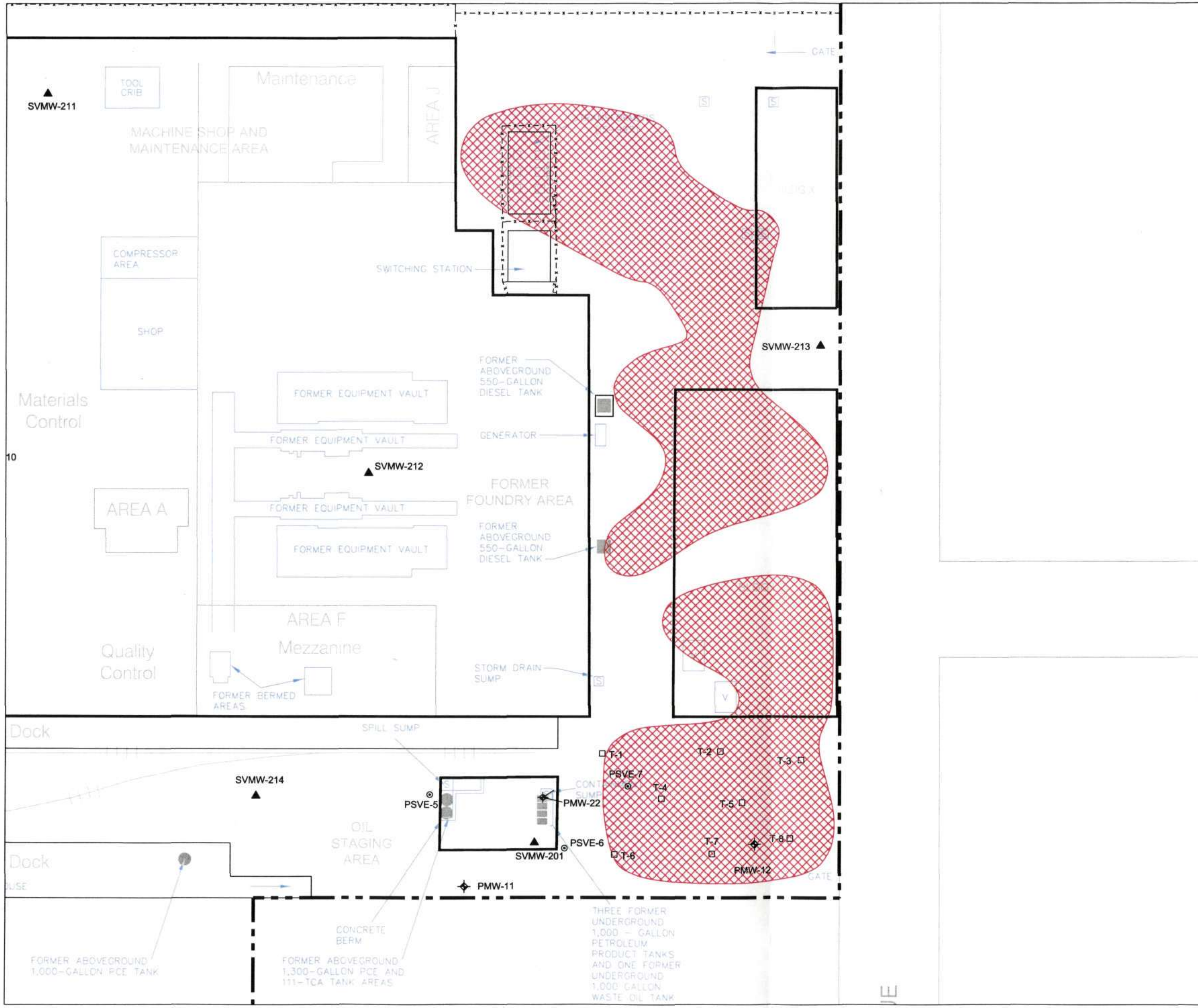
Extent of Proposed Soil Excavation at Oil Staging Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.09

Figure 8



0 60 120
(Approximate Scale in Feet)

Legend:

- ▲ Soil Vapor Monitoring Well
- Groundwater Monitoring Well
- Soil Vapor/Groundwater Monitoring Well
- □ Trench Soil Sample
- Former Aboveground or Underground Storage Tank or Process Unit
- Existing Interior Wall or Office
- Approximate Property Boundary
- Out-of-Service Railroad Spur
- Fence
- Former or Existing Trench
- Delineated Boundary of Non-VOC Source to be Excavated (See Note 2)

Abbreviations:

VOC = Volatile organic compound
RAO = Remedial action objective

Notes:

1. All locations are approximate.
2. Excavation will be performed until soil within the delineated boundaries contain non-VOCs at concentrations that achieve the RAOs, until soil is removed to a maximum of 3 feet below ground surface or adequate cover is provided pursuant to the Risk Management Plan.

Erler & Kalinowski, Inc.

Extent of Proposed Soil Excavation at Building L Area

Price Pfister, Inc.
Pacoima, CA
April 2003
EKI A20034.09

Figure 9

APPENDIX A

CALCULATION OF CUMULATIVE HAZARD INDEX AND CANCER RISK

LIST OF TABLES

APPENDIX A

CALCULATION OF CUMULATIVE HAZARD INDEX AND CANCER RISK

The human health remediation goals listed in Table 1 are the lowest of the human health remediation goals derived to be protective of each potentially exposed population (i.e., industrial/commercial workers, earthwork construction workers, and maintenance personnel) and corresponding potentially complete exposure pathways. Tables A-1 through A-3 summarize the remediation goals calculated for each potentially exposed populations and the goal selected in Table 1 to protective of all core users at the Site. The RI report (EKI, 2003b) describes the methodology followed to calculate the remediation goals.

The remediation goals are intended to assist with determining when remedial actions have met the remedial action objectives ("RAOs") described in Section 3. In lieu of using the human health remediation goals in Table 1, cumulative hazard indices ("HIs") and cancer risks for each potentially exposed population may be calculated to ensure that the RAOs of a cumulative HI of 1 and an excess lifetime cancer risk of 10^{-5} have been met for all potentially exposed populations.

A cumulative HI and cumulative cancer risk for each potentially exposed population will be calculated using equations A-1 and A-2, respectively. The representative concentration ("RC") of a chemical of concern ("COC") to be entered into the equations will be based upon appropriate arithmetic or geometric mean values of analytical data, the 95 percent upper confidence limits ("95% UCLs") on the appropriate means, or the maximum COC concentrations detected at the location in question. The maximum detected COC concentrations can be used as the RCs when there are insufficient data points.

Equation A-1 Cumulative Non-Carcinogenic Hazard Index for a Given Potentially Exposed Population

$$\text{Cumulative HI} = \left(\frac{RC_1}{RG_{nc1}}\right) + \left(\frac{RC_2}{RG_{nc2}}\right) + \ldots \left(\frac{RC_N}{RG_{ncN}}\right)$$

where:

$RC_{1,2 \ldots N}$ = representative concentration of each COC at a given source area

$RG_{nc1,2 \ldots N}$ = non-carcinogenic human health remediation goal for vapor intrusion or direct contact for each COC for the population of interest as listed in Table A-1, A-2, or A-3

Equation A-2 Cumulative Cancer Risk for a Given Potentially Exposed Population

$$\text{Cumulative Cancer Risk} = \left(\frac{RC_1}{RG_{c1}} \times 10^{-6}\right) + \left(\frac{RC_2}{RG_{c2}} \times 10^{-6}\right) + \ldots \left(\frac{RC_N}{RG_{cN}} \times 10^{-6}\right)$$

where:

$RC_{1,2 \ldots N}$ = representative concentration of each COC at a given source area

$RG_{c1,2 \ldots N}$ = carcinogenic human health remediation goal for vapor intrusion or direct contact for each COC for the population of interest as listed in Table A-1, A-2, or A-3

Table A-1

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Industrial/Commercial Workers (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Vapor Intrusion (2) RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Vapor Intrusion (2) RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Primary VOCs			
Tetrachloroethene	0 - 3	20	0.28
	3 - 30	2.3	0.031
	30 - 60	2.0	0.028
1,1,1-trichloroethane	0 - 3	580	-- (3)
	3 - 30	65	-- (3)
	30 - 60	58	-- (3)
Trichloroethene	0 - 3	350	0.82
	3 - 30	39	0.091
	30 - 60	35	0.082
cis-1,2-dichloroethene	0 - 3	20	-- (3)
	3 - 30	2.3	-- (3)
	30 - 60	2.0	-- (3)
1,1-dichloroethene	0 - 3	41	-- (3)
	3 - 30	4.5	-- (3)
	30 - 60	4.1	-- (3)
Secondary VOCs			
1,1-dichloroethane	0 - 3	200	1.0
	3 - 30	23	0.11
	30 - 60	20	0.10
1,2-dichloroethane	0 - 3	230	0.078
	3 - 30	26	0.0086
	30 - 60	23	0.0078
trans-1,2-dichloroethene	0 - 3	41	-- (3)
	3 - 30	4.5	-- (3)
	30 - 60	4.1	-- (3)
Vinyl Chloride	0 - 3	58	0.021
	3 - 30	6.5	0.0023
	30 - 60	5.8	0.0021
Bromomethane	0 - 3	2.9	-- (3)
	3 - 30	0.32	-- (3)
	30 - 60	0.29	-- (3)
Chloroform	0 - 3	170	0.31
	3 - 30	19	0.034
	30 - 60	17	0.031

Table A-1

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Industrial/Commercial Workers (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Vapor Intrusion (2) RG$_{nc}$ Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Vapor Intrusion (2) RG$_c$ Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Secondary VOCs			
Trichlorofluoromethane	0 - 3	410	-- (3)
	3 - 30	45	-- (3)
	30 - 60	41	-- (3)
Benzene	0 - 3	35	0.057
	3 - 30	3.9	0.0064
	30 - 60	3.5	0.0057
Toluene	0 - 3	170	-- (3)
	3 - 30	19	-- (3)
	30 - 60	17	-- (3)
Ethylbenzene	0 - 3	1200	-- (3)
	3 - 30	130	-- (3)
	30 - 60	120	-- (3)
Total Xylenes	0 - 3	410 (4)	-- (3)
	3 - 30	45 (4)	-- (3)
	30 - 60	41 (4)	-- (3)
Non-VOCs			
Metals and Cyanide			
Chromium	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Hexavalent Chromium	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Copper	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Lead	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Nickel	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--

Table A-1

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Industrial/Commercial Workers (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Vapor Intrusion (2)	
		RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
Non-VOCs			
Metals and Cyanide			
Zinc	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Cyanide	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Semi-Volatile Organic Compounds			
Chrysene	0 - 3	-- (5)	15
	3 - 30	-- (5)	110
	30 - 60	-- (5)	940
Phenanthrene	0 - 3	74,000	-- (3)
	3 - 30	280,000	-- (3)
	30 - 60	2,100,000	-- (3)
Pyrene	0 - 3	14,000	-- (3)
	3 - 30	96,000	-- (3)
	30 - 60	840,000	-- (3)

Table A-1

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Industrial/Commercial Workers (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

--	not calculated
ft bgs	feet below ground surface
mg/kg	milligrams per kilogram
VOC	volatile organic compound

Notes

(1) Human health toxicity values and physical exposure parameters used in calculating remediation goals are summarized in Appendix B of EKI's *Remedial Action Plan*, dated 25 April 2003. Remediation goals assume a non-carcinogenic target risk level that corresponds to a hazard index of 1 for an individual chemical and a carcinogenic target risk level of one-in-one million (i.e., 10^{-6}) incremental risk of an individual developing cancer from exposure to an individual chemical.

(2) These remediation goals have been calculated through use of U.S. EPA Johnson and Ettinger vapor intrusion computer model. Remediation goals for vapor intrusion were calculated only for those compounds considered to be volatile. Volatile compounds are defined to be chemicals that have Henry's Law constants greater than 10^{-5} atmospheres-cubic meters per mole and molecular weights less than 200 grams per mole.

(3) U.S. EPA and California Environmental Protection Agency Office of Environmental Health Hazard Assessment do not classify compound as a potential carcinogen.

(4) The remediation goal listed in this table is the most conservative of the values calculated for the three xylene isomers.

(5) No published chronic reference dose is available for this compound, and no suitable surrogate compound was identified.

Table A-2

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Earthwork Construction Workers (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2): RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2): RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Primary VOCs			
Tetrachloroethene	0 - 3	18	6.4
	3 - 30	18	6.4
	30 - 60	18	6.4
1,1,1-trichloroethane	0 - 3	290	-- (3)
	3 - 30	290	-- (3)
	30 - 60	290	-- (3)
Trichloroethene	0 - 3	43	0.72
	3 - 30	43	0.72
	30 - 60	43	0.72
cis-1,2-dichloroethene	0 - 3	16	-- (3)
	3 - 30	16	-- (3)
	30 - 60	16	-- (3)
1,1-dichloroethene	0 - 3	16	-- (3)
	3 - 30	16	-- (3)
	30 - 60	16	-- (3)
Secondary VOCs			
1,1-dichloroethane	0 - 3	130	22
	3 - 30	130	22
	30 - 60	130	22
1,2-dichloroethane	0 - 3	200	2.5
	3 - 30	200	2.5
	30 - 60	200	2.5
trans-1,2-dichloroethene	0 - 3	22	-- (3)
	3 - 30	22	-- (3)
	30 - 60	22	-- (3)
Vinyl Chloride	0 - 3	19	0.23
	3 - 30	19	0.23
	30 - 60	19	0.23
Bromomethane	0 - 3	1.4	-- (3)
	3 - 30	1.4	-- (3)
	30 - 60	1.4	-- (3)
Chloroform	0 - 3	140	8.7
	3 - 30	140	8.7
	30 - 60	140	8.7

Table A-2

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Earthwork Construction Workers (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2) — RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2) — RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Secondary VOCs			
Trichlorofluoromethane	0 - 3	290	-- (3)
	3 - 30	290	-- (3)
	30 - 60	290	-- (3)
Benzene	0 - 3	20	1.2
	3 - 30	20	1.2
	30 - 60	20	1.2
Toluene	0 - 3	160	-- (3)
	3 - 30	160	-- (3)
	30 - 60	160	-- (3)
Ethylbenzene	0 - 3	1,200	-- (3)
	3 - 30	1,200	-- (3)
	30 - 60	1,200	-- (3)
Total Xylenes	0 - 3	360	-- (3)
	3 - 30	360	-- (3)
	30 - 60	360	-- (3)
Non-VOCs			
Metals and Cyanide			
Chromium	0 - 3	4,400	3,000
	3 - 30	4,400	3,000
	30 - 60	4,400	3,000
Hexavalent Chromium	0 - 3	640	430
	3 - 30	640	430
	30 - 60	640	430
Copper	0 - 3	7,700	-- (3)
	3 - 30	7,700	-- (3)
	30 - 60	7,700	-- (3)
Lead	0 - 3	740 (4)	--
	3 - 30	740 (4)	--
	30 - 60	740 (4)	--
Nickel	0 - 3	3,700	240,000
	3 - 30	3,700	240,000
	30 - 60	3,700	240,000

Table A-2

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Earthwork Construction Workers (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2) RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2) RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
Non-VOCs			
Metals and Cyanide			
Zinc	0 - 3	63,000	-- (3)
	3 - 30	63,000	-- (3)
	30 - 60	63,000	-- (3)
Cyanide	0 - 3	4,200	-- (3)
	3 - 30	4,200	-- (3)
	30 - 60	4,200	-- (3)
Semi-Volatile Organic Compounds			
Chrysene	0 - 3	-- (5)	130
	3 - 30	-- (5)	130
	30 - 60	-- (5)	130
Phenanthrene	0 - 3	37,000	-- (3)
	3 - 30	37,000	-- (3)
	30 - 60	37,000	-- (3)
Pyrene	0 - 3	4,300	-- (3)
	3 - 30	4,300	-- (3)
	30 - 60	4,300	-- (3)

Abbreviations

-- not calculated
ft bgs feet below ground surface
mg/kg milligrams per kilogram
VOC volatile organic compound

Notes

(1) Human health toxicity values and physical exposure parameters used in calculating remediation goals are summarized in Appendix B of EKI's *Remedial Action Plan*, dated 25 April 2003. Remediation goals assume a non-carcinogenic target risk level that corresponds to a hazard index of 1 for an individual chemical and a carcinogenic target risk level of one-in-one million (i.e., 10^{-6}) incremental risk of an individual developing cancer from exposure to an individual chemical.

(2) These remediation goals for soil calculated through use of equations presented in EKI's *Remedial Investigation Report*, dated 7 February 2003.

(3) U.S. EPA and California Environmental Protection Agency Office of Environmental Health Hazard Assessment do not classify compound as a potential carcinogen.

(4) Remediation goal for lead calculated using DTSC Lead Spread Version 7.0 computer model.

(5) No published chronic reference dose is available for this compound, and no suitable surrogate compound was identified.

Table A-3

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Maintenance Personnel (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2) RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Primary VOCs			
Tetrachloroethene	0 - 3	100	1.0
	3 - 30	100	1.0
	30 - 60	100	1.0
1,1,1-trichloroethane	0 - 3	1,700	-- (3)
	3 - 30	1,700	-- (3)
	30 - 60	1,700	-- (3)
Trichloroethene	0 - 3	190	2.1
	3 - 30	190	2.1
	30 - 60	190	2.1
cis-1,2-dichloroethene	0 - 3	91	-- (3)
	3 - 30	91	-- (3)
	30 - 60	91	-- (3)
1,1-dichloroethene	0 - 3	99	-- (3)
	3 - 30	99	-- (3)
	30 - 60	99	-- (3)
Secondary VOCs			
1,1-dichloroethane	0 - 3	770	3.8
	3 - 30	770	3.8
	30 - 60	770	3.8
1,2-dichloroethane	0 - 3	1,200	0.43
	3 - 30	1,200	0.43
	30 - 60	1,200	0.43
trans-1,2-dichloroethene	0 - 3	120	-- (3)
	3 - 30	120	-- (3)
	30 - 60	120	-- (3)
Vinyl Chloride	0 - 3	110	0.040
	3 - 30	110	0.040
	30 - 60	110	0.040
Bromomethane	0 - 3	8.3	-- (3)
	3 - 30	8.3	-- (3)
	30 - 60	8.3	-- (3)
Chloroform	0 - 3	790	1.5
	3 - 30	790	1.5
	30 - 60	790	1.5

Table A-3

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Maintenance Personnel (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2): RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2): RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Secondary VOCs			
Trichlorofluoromethane	0 - 3	1,700	-- (3)
	3 - 30	1,700	-- (3)
	30 - 60	1,700	-- (3)
Benzene	0 - 3	120	0.20
	3 - 30	120	0.20
	30 - 60	120	0.20
Toluene	0 - 3	950	-- (3)
	3 - 30	950	-- (3)
	30 - 60	950	-- (3)
Ethylbenzene	0 - 3	7,000	-- (3)
	3 - 30	7,000	-- (3)
	30 - 60	7,000	-- (3)
Total Xylenes	0 - 3	2,100	-- (3)
	3 - 30	2,100	-- (3)
	30 - 60	2,100	-- (3)
Non-VOCs			
Metals and Cyanide			
Chromium	0 - 3	26,000	1,900
	3 - 30	26,000	1,900
	30 - 60	26,000	1,900
Hexavalent Chromium	0 - 3	3,800	270
	3 - 30	3,800	270
	30 - 60	3,800	270
Copper	0 - 3	49,000	-- (3)
	3 - 30	49,000	-- (3)
	30 - 60	49,000	-- (3)
Lead	0 - 3	740 (4)	--
	3 - 30	740 (4)	--
	30 - 60	740 (4)	--
Nickel	0 - 3	15,000	7,300
	3 - 30	15,000	7,300
	30 - 60	15,000	7,300

Table A-3

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Maintenance Personnel (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2) RG$_{nc}$ Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2) RG$_c$ Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
Non-VOCs			
Metals and Cyanide			
Zinc	0 - 3	400,000	-- (3)
	3 - 30	400,000	-- (3)
	30 - 60	400,000	-- (3)
Cyanide	0 - 3	24,000	-- (3)
	3 - 30	24,000	-- (3)
	30 - 60	24,000	-- (3)
Semi-Volatile Organic Compounds			
Chrysene	0 - 3	-- (6)	14
	3 - 30	-- (6)	14
	30 - 60	-- (6)	14
Phenanthrene	0 - 3	150,000	-- (3)
	3 - 30	150,000	-- (3)
	30 - 60	150,000	-- (3)
Pyrene	0 - 3	16,000	-- (3)
	3 - 30	16,000	-- (3)
	30 - 60	16,000	-- (3)

Abbreviations

-- not calculated
ft bgs feet below ground surface
mg/kg milligrams per kilogram
VOC volatile organic compound

Notes

(1) Human health toxicity values and physical exposure parameters used in calculating remediation goals are summarized in Appendix B of EKI's *Remedial Action Plan*, dated 25 April 2003. Remediation goals assume a non-carcinogenic target risk level that corresponds to a hazard index of 1 for an individual chemical and a carcinogenic target risk level of one-in-one million (i.e., 10^{-6}) incremental risk of an individual developing cancer from exposure to an individual chemical.

(2) These remediation goals have been calculated through use of equations presented in EKI's *Remedial Investigation Report*, dated 7 February 2003.

(3) U.S. EPA and California Environmental Protection Agency Office of Environmental Health Hazard Assessment do not classify compound as a potential carcinogen.

(4) Remediation goal for lead calculated using DTSC Lead Spread Version 7.0 computer model.

(5) No published chronic reference dose is available for this compound, and no suitable surrogate compound was identified.

APPENDIX B

CALCULATION OF CUMULATIVE HAZARD INDEX AND CANCER RISK

LIST OF TABLES

APPENDIX B

CALCULATION OF
CUMULATIVE HAZARD INDEX AND CANCER RISK

The human health remediation goals listed in Table 4 are the lowest of the human health remediation goals derived to be protective of each potentially exposed population (i.e., industrial/commercial workers, earthwork construction workers, and maintenance personnel) and corresponding potentially complete exposure pathways. Tables B-1 through B-4 summarize the physical parameters, exposure parameters and toxicity values employed to calculate the remediation goals. Tables B-5 through B-8 summarize the remediation goals calculated for each potentially exposed populations and the goal selected in Table 4 to protective of all core users at the Site. The RI report (EKI, 2003b) describes the methodology followed to calculate the remediation goals.

The remediation goals are intended to assist with determining when remedial actions have met the remedial action objectives ("RAOs") described in Section 6. In lieu of using the human health remediation goals in Table 4, cumulative hazard indices ("HIs") and cancer risks for each potentially exposed population may be calculated to ensure that the RAOs of a cumulative HI of 1 and an excess lifetime cancer risk of 10^{-5} have been met for all potentially exposed populations.

A cumulative HI and cumulative cancer risk for each potentially exposed population will be calculated using equations B-1 and B-2, respectively. The representative concentration ("RC") of a chemical of concern ("COC") to be entered into the equations will be based upon appropriate arithmetic or geometric mean values of analytical data, the 95 percent upper confidence limits ("95% UCLs") on the appropriate means, or the maximum COC concentrations detected at the location in question. The maximum detected COC concentrations can be used as the RCs when there are insufficient data points.

Equation B-1 Cumulative Non-Carcinogenic Hazard Index for a Given Potentially Exposed Population

$$\text{Cumulative HI} = \left(\frac{RC_1}{RG_{nc1}}\right) + \left(\frac{RC_2}{RG_{nc2}}\right) + \ldots \left(\frac{RC_N}{RG_{ncN}}\right)$$

where:

$RC_{1,2\ldots N}$ = representative concentration of each COC at a given source area

$RG_{nc1,2\ldots N}$ = non-carcinogenic human health remediation goal for vapor intrusion or direct contact for each COC for the population of interest as listed in Table B-5, B-6, or B-7

Equation B-2 Cumulative Cancer Risk for a Given Potentially Exposed Population

$$\text{Cumulative Cancer Risk} = \left(\frac{RC_1}{RG_{c1}} \times 10^{-6}\right) + \left(\frac{RC_2}{RG_{c2}} \times 10^{-6}\right) + \ldots \left(\frac{RC_N}{RG_{cN}} \times 10^{-6}\right)$$

where:

$RC_{1,2\ldots N}$ = representative concentration of each COC at a given source area

$RG_{c1,2\ldots N}$ = carcinogenic human health remediation goal for vapor intrusion or direct contact for each COC for the population of interest as listed in Table B-5, B-6, or B-7

Table B-1

Physical Parameters Used To Calculate Remediation Goals

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Parameter	Symbol	Unit	Value	Note/Reference
Building Parameters				
Length of building	-	cm	2,600	Assumed length of planned building
Width of building	-	cm	1,887	Assumed width of planned building
Height of building	-	cm	305	Equivalent to 10 ft; typical of a commercial building
Slab thickness	-	cm	15	Default value for Johnson and Ettinger model (2)
Indoor air exchange rate	-	1/hr	1	Specified by DTSC HERD for another project
Indoor pressure differential	-	$g/cm\text{-}s^2$	40	Default value for Johnson and Ettinger model (2)
Floor-wall seam crack width	-	cm	0.1	Default value for Johnson and Ettinger model (2)
Climatic Parameters				
Rainfall recharge rate	-	ft/yr	0.15	Approximately 15% of average annual rainfall in San Fernando, California (3)
Thickness of aboveground mixing zone	DH	cm	200	Default value (4)
Wind speed above ground surface	V	cm/s	225	Default value (4)
Soil Parameters				
Fraction organic carbon content in soil	f_{oc}	-	0.00092	Average of Site-specific vadose zone data (1)
Soil dry bulk density	ρ_b	g/cm^3	1.83	Average of Site-specific vadose zone data (1)
Total soil porosity in vadose zone	n	-	0.354	Average of Site-specific vadose zone data (1)
Volumetric air content in vadose zone	θ_a	-	0.267	Average of Site-specific vadose zone data (1)
Volumetric water content in vadose zone	θ_w	-	0.087	Calculated as $n - \theta_a$
Air-filled soil permeability	k_v	cm^2	5×10^{-7}	Average of Site-specific vadose zone data from EKI soil-vapor extraction pilot test
Soil temperature	-	°C	25	Approximately equal to average groundwater temperature at the Site.
Capillary Zone Parameters				
Total soil porosity in capillary zone	n_c	-	0.354	Equal to total soil porosity in vadose zone
Volumetric air content in capillary zone	θ_{ac}	-	0.004	Equal to one percent of total porosity
Volumetric water content in capillary zone	θ_{wc}	-	0.350	Calculated as $n - \theta_{ac}$
Thickness of capillary zone	-	cm	17	Default value for Johnson and Ettinger model (2)
Groundwater Parameters				
Depth to groundwater	-	cm	1,829	Equivalent to 60 feet; approximately equal to average depth to groundwater at the Site.
Hydraulic gradient	-	-	0.0007	August 2002 Site-specific data
Hydraulic conductivity	-	cm/s	0.038	Calculated using average of Site-specific vadose zone data
Groundwater velocity	-	ft/yr	80	Calculated from hydraulic gradient and conductivity
Thickness of groundwater mixing zone	-	ft	15	Typical length of screen interval in Site groundwater wells

Table B-1

Physical Parameters Used To Calculate Remediation Goals

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

-	not applicable
°C	degrees Celcius
1/hr	per hour
cm	centimeters
cm/s	centimeters per second
cm^2	square centimeters
DTSC HERD	Department of Toxic Substances Control Human and Ecological Risk Division
ft/yr	feet per year
$g/cm\text{-}s^2$	grams per centimeter per square second
g/cm^3	grams per cubic centimeter

Notes

(1) PTS Laboratories, Inc. 16, 18, 23, 30, and 31 July 2002. *Physical Properties Data.*

(2) U.S. EPA. December 2000. User's Guide for the Johnson and Ettinger (1991) *Model for Subsurface Vapor Intrusion Into Buildings (Revised).*

(3) Western Regional Climate Center Precipitation Data 1971 - 2000

(4) U.S. EPA. 1991a. *Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), Interim.* Office of Solid Waste and Emergency Response. Publication: 9285.7-01B.

Table B-2

Exposure Parameters Used To Calculate Remediation Goals

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Parameter	Symbol	Unit	Value	Note/Reference
Averaging Time	AT			
Carcinogens		year	70	U.S. EPA 1991a; Cal/EPA 1992
Non-carcinogens		year	ED	U.S. EPA 1991a; Cal/EPA 1992
Body Weight	BW			
Earthwork construction worker		kg	70	U.S. EPA 1991a; Cal/EPA 1992
Industrial/commercial worker		kg	70	U.S. EPA 1991a; Cal/EPA 1992
Maintenance personnel		kg	70	U.S. EPA 1991a; Cal/EPA 1992
Dermal Absorption Factor	ABS			
Volatile organic compounds			0.1	Cal/EPA 1994
Hexavalent Chromium			0	Cal/EPA 1994
Other metals and cyanide			0.01	Cal/EPA 1994
Semi-volatile organic compounds			0.15	Cal/EPA 1994
Exposure Duration	ED			
Earthwork construction worker		year	0.75	Best professional judgement
Industrial/commercial worker		year	25	U.S. EPA 1991a; Cal/EPA 1992
Maintenance personnel		year	25	U.S. EPA 1991a; Cal/EPA 1992
Exposure Frequency	EF			
Earthwork construction worker		day/year	250	Best professional judgment
Industrial/commercial worker		day/year	250	U.S. EPA 1991a; Cal/EPA 1992
Maintenance personnel				
Performing excavation work		day/year	12	Best professional judgment (1)
Performing non-excavation work		day/year	238	Best professional judgment (1)
Exposure Interval	T			
Earthwork construction worker		s	2.37×10^{7}	Calculated as ED*3.16 x 10^{7} seconds/year
Industrial/commercial worker		--	--	(2)
Maintenance personnel		s	7.9×10^{8}	Calculated as ED*3.16 x 10^{7} seconds/year
Ingestion Rate for Soil	IR_{soil}			
Earthwork construction worker		mg/day	480	U.S. EPA 1991b
Industrial/commercial worker		--	--	(2)
Maintenance personnel				
Performing excavation work		mg/day	480	U.S. EPA 1991b; (3)
Performing non-excavation work		mg/day	50	U.S. EPA 1991a; Cal/EPA 1992; (3)

Table B-2

Exposure Parameters Used To Calculate Remediation Goals

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Parameter	Symbol	Unit	Value	Note/Reference
Inhalation Rate for Air	IR_{air}			
Earthwork construction worker		m^3/day	20	U.S. EPA 1991a; Cal/EPA 1992
Industrial/commercial worker		m^3/day	20	U.S. EPA 1991a; Cal/EPA 1992
Maintenance personnel		m^3/day	20	U.S. EPA 1991a; Cal/EPA 1992
Particulate Emission Factor	PEF			
Earthwork construction worker		m^3/kg	4.63×10^9	U.S. EPA 2002
Industrial/commercial worker		--	--	(2)
Maintenance personnel		m^3/kg	4.63×10^9	U.S. EPA 2002
Skin Surface Area Exposed to Soil	SA			
Earthwork construction worker		cm^2/day	3,300	U.S. EPA 2001; (4)
Industrial/commercial worker		--	--	(2)
Maintenance personnel				
Performing excavation work		cm^2/day	3,300	U.S. EPA 2001; (3), (4)
Performing non-excavation work		cm^2/day	3,300	U.S. EPA 2001; (3), (4)
Soil-to-Air Volatilization Factor	VF			
Earthwork construction worker		m^3/kg		Chemical-specific value (5)
Industrial/commercial worker		--	--	(6)
Maintenance personnel		m^3/kg		Chemical-specific value (5)
Soil-to-Skin Adherence Factor	AF			
Earthwork construction worker		mg/cm^2	0.3	U.S. EPA 2001; (7)
Industrial/commercial worker		--	--	(2)
Maintenance personnel				
Performing excavation work		mg/cm^2	0.3	U.S. EPA 2001; (3), (7)
Performing non-excavation work		mg/cm^2	0.2	U.S. EPA 2001; (3)

Table B-2

Exposure Parameters Used To Calculate Remediation Goals

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

cm^2/day	square centimeters per day
kg	kilograms
m^3/day	cubic meters per day
m^3/kg	cubic meters per kilogram
mg/cm^2	milligrams per square centimeter
mg/day	milligrams per day
s	seconds

Notes

(1) Exposure frequency for maintenance personnel is based upon best professional judgement and assumes individual will be engaged in earthwork activities for 12 days per year at the site and will conduct activities that do not involve excavation for 238 days per year at the site.

(2) Risk-based screening levels for direct contact with soil at the Site were not calculated for industrial/commercial workers. Risk-based screening levels calculated to be protective of earthwork construction workers and maintenance personnel are also believed to be protective of industrial/commercial workers because of their limited direct exposure to contaminated soil.

(3) Based upon best professional judgment. When maintenance personnel are engaged in earthwork activities, exposure parameters (with the exception of exposure duration) are assumed to be the same as an earthwork construction worker. When maintenance personnel are not engaged in earthwork activities, exposure parameters are assumed to be the same as an industrial/commercial worker.

(4) Skin surface area calculated based on heads, hands, and forearms, assuming these populations wear clothing consisting of a short-sleeved shirt, long pants, and shoes.

(5) Soil-to-outdoor-air volatilization factor is chemical-specific. Volatilization factors were calculated using the equation in Section 3.3.1 in U.S. EPA's *Risk Assessment Guidance for Superfund, Part B*, dated December 1991, and input parameters listed in Table 24.

(6) The soil-to-outdoor-air volatilization factor was not utilized for the industrial/commercial worker. This exposure pathway was modeled using the Johnson and Ettinger model for vapor intrusion into indoor air.

(7) The soil-to-skin adherence factor for the earthwork construction worker is based on the 95th percentile of the weighted soil adherence factor for construction workers (U.S. EPA, 2001).

References

Cal/EPA. July 1992 (corrected and reprinted August 1996). Supplemental Guidance for Human Health *Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities,* California Environmental Protection Agency, Department of Toxic Substances Control.

Cal/EPA. 1994 (reprinted June 1999). Preliminary Endangerment Assessment Guidance Manual, California Environmental Protection Agency, Department of Toxic Substances Control.

U.S. EPA. 1991a. *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (Part B, Development of Risk-based Preliminary Remediation Goals), Interim.* Office of Solid Waste and Emergency Response. Publication: 9285.7-01B.

U.S. EPA. 25 March 1991b. *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors.* Interim Final. U.S. Environmental Protection Agency, Region IX, October 2002.

U.S. EPA. September 2001. *Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual – Part E (Supplemental Guidance for Dermal Risk Assessment), Interim.* Office of Solid Waste and Emergency Response.

U.S. EPA. 2002. *Preliminary Remediation Goals Tables,* U.S. Environmental Protection Agency, Region IX, October 2002.

Table B-3

Non-Carcinogenic Human Health Toxicity Values for Chemicals Of Concern

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Chronic Oral Reference Dose (mg/kg-day)	Chronic Inhalation Reference Dose (mg/kg-day)	Potential Health Effect	Reference (1)
		VOCs		
Primary VOCs				
Tetrachloroethene	0.01	0.01	Hepatotoxicity, weight gain; Kidney, alimentary system	IRIS (o) OEHHA (i)
1,1,1-trichloroethane	0.28	0.29	Nervous system	PRG (o) OEHHA (i)
Trichloroethene	0.0003	0.17	Liver, kidney, fetus; Nervous system, eyes	NCEA (o) OEHHA (i)
cis-1,2-dichloroethene	0.01	0.01 (2)	Decreased hematocrit and hemoglobin in blood	HEAST (o)
1,1-dichloroethene	0.05	0.02	Liver toxicity; Alimentary system	IRIS (o) OEHHA (i)
Secondary VOCs				
1,1-dichloroethane	0.10 (2)	0.10	--	HEAST (i)
1,2-dichloroethane	0.03	0.11	Alimentary system	PRG (o) OEHHA (i)
trans-1,2-dichloroethene	0.02	0.02 (2)	Increased serum alkaline phosphatase	IRIS (o)
Vinyl Chloride	0.003	0.029	Liver cell polymorphism	IRIS
Bromomethane	0.0014	0.0014	Epithelial hyperplasia of the forestomach; Respiratory system, nervous system, development	IRIS
Chloroform	0.01	0.086	Moderate or marked fatty cyst formation in the liver; Alimentary system, kidney, development	IRIS (o) OEHHA (i)
Trichlorofluoromethane	0.3	0.2	Survival and histopathology	IRIS (o) HEAST (i)

Table B-3

Non-Carcinogenic Human Health Toxicity Values for Chemicals Of Concern

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Chronic Oral Reference Dose (mg/kg-day)	Chronic Inhalation Reference Dose (mg/kg-day)	Potential Health Effect	Reference (1)
		VOCs		
Secondary VOCs				
Benzene	0.003	0.017	Hematopoietic system; development; nervous system	PRG (o) OEHHA (i)
Toluene	0.2	0.086	Changes in liver and kidney weights; Nervous system, respiratory system, development	IRIS (o) OEHHA (i)
Ethylbenzene	0.1	0.57	Liver and kidney toxicity; Development, alimentary system, kidney, endocrine system	IRIS (o) OEHHA (i)
Total Xylenes	2	0.20	Hyperactivity; decreased body weight and increased mortality (males); Nervous system, respiratory system	IRIS (o) OEHHA (i)
		Non-VOCs		
Metals and Cyanide				
Chromium (3)	1.5	1.5 (2)	--	IRIS (o)
Hexavalent Chromium	0.003	0.000057	Nasal septum atrophy; Respiratory system	IRIS (o) OEHHA (i)
Copper	0.037 (4)	0.037 (2)	--	HEAST (o)
Lead	--	--	--	--
Nickel	0.02	0.000014	Decreased body and organ weights; Respiratory system, hematopoietic system	IRIS (o) OEHHA (i)
Zinc	0.3	0.3 (2)	Decreased blood enzyme	IRIS (o)
Cyanide	0.02	0.02 (2)	Weight loss, thyroid effects and myelin degeneration	IRIS (o)
Semi-Volatile Organic Compounds				
Chrysene	--	--	--	--
Phenanthrene	0.30	0.30 (2)	--	IRIS (o) (5)
Pyrene	0.03	0.03 (2)	Kidney effects	IRIS (o)

Table B-3

Non-Carcinogenic Human Health Toxicity Values for Chemicals Of Concern

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

--	no information available
HEAST	U.S. EPA Health Effects Assessment Summary Tables, dated July 1997
IRIS	U.S. EPA Integrated Risk Information System, retrieved October 2002
mg/kg-day	milligrams per kilogram per day
NCEA	U.S. EPA National Center for Environmental Assessment, Draft Risk Assessment Issue Papers for individual chemicals
OEHHA	California Environmental Protection Agency Office of Environmental Health Hazard Assessment, Technical Support Document for the Determination of Noncancer Chronic Reference Exposure Levels, updated in September 2002
PRG	U.S. EPA, Region IX Preliminary Remediation Goals Table, dated October 2002
VOC	volatile organic compound

Notes

(1) References are defined above. An "(o)" following the reference abbreviation indicates the source for the oral reference dose. An "(i)" following the reference abbreviation indicates the source for the inhalation reference dose. If no such designation is made, both are from the same source. Toxicity values were obtained from the references in the following order: OEHHA; IRIS; HEAST; NCEA; PRG.

(2) No reference dose was available for this exposure route; therefore, the reference does from the other exposure route was used in the calculations (i.e., "route-to-route extrapolation").

(3) Toxicity values listed are those available for trivalent chromium.

(4) The reference dose for copper is listed in HEAST as 1.3 milligrams per liter. This dose has been converted to mg/kg-day using a water ingestion rate of 2 liters per day and an assumed average body weight of 70 kilograms.

(5) No reference dose for phenanthrene was available. At the suggestion of U.S. EPA Superfund Technical Support staff, the reference dose for anthracene was used, which is a structurally similar surrogate compound.

Table B-4

Carcinogenic Human Health Toxicity Values for Chemicals of Concern

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Oral Slope Factor $(mg/kg\text{-}day)^{-1}$	Inhalation Slope Factor $(mg/kg\text{-}day)^{-1}$	Weight-of-Evidence Classification (1)	Reference (2)
VOCs				
Primary VOCs				
Tetrachloroethene	0.54	0.021	--	OEHHA
1,1,1-trichloroethane	--	--	D	--
Trichloroethene	0.015	0.010	--	OEHHA
cis-1,2-dichloroethene	--	--	D	--
1,1-dichloroethene	--	--	C	-- (3)
Secondary VOCs				
1,1-dichloroethane	0.0057	0.0057	C	OEHHA
1,2-dichloroethane	0.047	0.072	B2	OEHHA
trans-1,2-dichloroethene	--	--	--	--
Vinyl Chloride	0.27	0.27	A	OEHHA
Bromomethane	--	--	D	--
Chloroform	0.031	0.019	B2	OEHHA
Trichlorofluoromethane	--	--	--	--
Benzene	0.10	0.10	A	OEHHA
Toluene	--	--	D	--
Ethylbenzene	--	--	D	--
Total Xylenes	--	--	D	--
Non-VOCs				
Metals and Cyanide				
Chromium	--	--	--	--
Hexavalent Chromium	-- (4)	510	A	OEHHA
Copper	--	--	D	--
Lead	--	--	--	--
Nickel	--	0.91	A	OEHHA
Zinc	--	--	D	--
Cyanide	--	--	D	--
Semi-Volatile Organic Compounds				
Chrysene	0.12	0.039	B2	OEHHA
Phenanthrene	--	--	D	--
Pyrene	--	--	D	--

Table B-4

Carcinogenic Human Health Toxicity Values for Chemicals of Concern

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

--	no information available
HEAST	U.S. EPA Health Effects Assessment Summary Tables, dated July 1997
IRIS	U.S. EPA Integrated Risk Information System, retrieved October 2002
mg/kg-day	milligrams per kilogram per day
NCEA	U.S. EPA National Center for Environmental Assessment, Draft Risk Assessment Issue Papers for individual chemicals
OEHHA	Office of Environmental Health Hazard Assessment website entitled California Cancer Potency Factors, dated September 2002
PRG	U.S. EPA, Region IX Preliminary Remediation Goals Table, dated October 2002

Notes

(1) U.S. EPA weight-of-evidence classifications are as follows:

A	Human Carcinogen
B1	Probable Human Carcinogen; limited human data are available
B2	Probable Human Carcinogen; sufficient evidence in animals and inadequate or no evidence in humans
C	Possible Human Carcinogen
D	Not Classifiable as to Human Carcinogenicity
E	Evidence of Non-Carcinogenicity in Humans

All weight-of-evidence classifications were taken from IRIS.

(2) References are defined above. Toxicity values were obtained from the references in the following order: OEHHA; IRIS; HEAST; NCEA; PRG.

(3) A slope factor for 1,1-dichloroethene is provided in HEAST based on an outdated IRIS report. The IRIS report was updated in August 2002 to withdraw the slope factor for 1,1-dichloroethene.

(4) According to IRIS, no evidence of carcinogenicity of hexavalent chromium exists for the oral route of exposure

Table B-5

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Industrial/Commercial Workers (1)

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Vapor Intrusion (2): RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Vapor Intrusion (2): RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Primary VOCs			
Tetrachloroethene	0 - 3	20	0.28
	3 - 30	2.3	0.031
	30 - 60	2.0	0.028
1,1,1-trichloroethane	0 - 3	580	-- (3)
	3 - 30	65	-- (3)
	30 - 60	58	-- (3)
Trichloroethene	0 - 3	350	0.82
	3 - 30	39	0.091
	30 - 60	35	0.082
cis-1,2-dichloroethene	0 - 3	20	-- (3)
	3 - 30	2.3	-- (3)
	30 - 60	2.0	-- (3)
1,1-dichloroethene	0 - 3	41	-- (3)
	3 - 30	4.5	-- (3)
	30 - 60	4.1	-- (3)
Secondary VOCs			
1,1-dichloroethane	0 - 3	200	1.0
	3 - 30	23	0.11
	30 - 60	20	0.10
1,2-dichloroethane	0 - 3	230	0.078
	3 - 30	26	0.0086
	30 - 60	23	0.0078
trans-1,2-dichloroethene	0 - 3	41	-- (3)
	3 - 30	4.5	-- (3)
	30 - 60	4.1	-- (3)
Vinyl Chloride	0 - 3	58	0.021
	3 - 30	6.5	0.0023
	30 - 60	5.8	0.0021
Bromomethane	0 - 3	2.9	-- (3)
	3 - 30	0.32	-- (3)
	30 - 60	0.29	-- (3)
Chloroform	0 - 3	170	0.31
	3 - 30	19	0.034
	30 - 60	17	0.031

Table B-5

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Industrial/Commercial Workers (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Vapor Intrusion (2)	
		RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Secondary VOCs			
Trichlorofluoromethane	0 - 3	410	-- (3)
	3 - 30	45	-- (3)
	30 - 60	41	-- (3)
Benzene	0 - 3	35	0.057
	3 - 30	3.9	0.0064
	30 - 60	3.5	0.0057
Toluene	0 - 3	170	-- (3)
	3 - 30	19	-- (3)
	30 - 60	17	-- (3)
Ethylbenzene	0 - 3	1200	-- (3)
	3 - 30	130	-- (3)
	30 - 60	120	-- (3)
Total Xylenes	0 - 3	410 (4)	-- (3)
	3 - 30	45 (4)	-- (3)
	30 - 60	41 (4)	-- (3)
Non-VOCs			
Metals and Cyanide			
Chromium	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Hexavalent Chromium	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Copper	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Lead	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Nickel	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--

Table B-5

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Industrial/Commercial Workers (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Vapor Intrusion (2)	
		RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
Non-VOCs			
Metals and Cyanide			
Zinc	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Cyanide	0 - 3	--	--
	3 - 30	--	--
	30 - 60	--	--
Semi-Volatile Organic Compounds			
Chrysene	0 - 3	-- (5)	15
	3 - 30	-- (5)	110
	30 - 60	-- (5)	940
Phenanthrene	0 - 3	74,000	-- (3)
	3 - 30	280,000	-- (3)
	30 - 60	2,100,000	-- (3)
Pyrene	0 - 3	14,000	-- (3)
	3 - 30	96,000	-- (3)
	30 - 60	840,000	-- (3)

Table B-5

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Industrial/Commercial Workers (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

--	not calculated
mg/kg	milligrams per kilogram
VOC	Volatile organic compound

Notes:

(1) Human health toxicity values and physical exposure parameters used in calculating remediation goals are summarized in Tables B-1 through B-4. Remediation goals assume a non-carcinogenic target risk level that corresponds to a hazard index of 1 for an individual chemical and a carcinogenic target risk level of one-in-one million (i.e., 10^{-6}) incremental risk of an individual developing cancer from exposure to an individual chemical.

(2) These remediation goals have been calculated through use of U.S. EPA Johnson and Ettinger vapor intrusion computer model. Remediation goals for vapor intrusion were calculated only for those compounds considered to be volatile. Volatile compounds are defined to be chemicals that have Henry's Law constants greater than 10^{-5} atmospheres-cubic meters per mole and molecular weights less than 200 grams per mole.

(3) U.S. EPA and California Environmental Protection Agency Office of Environmental Health Hazard Assessment do not classify compound as a potential carcinogen.

(4) The remediation goal listed in this table is the most conservative of the values calculated for the three xylene isomers.

(5) No published chronic reference dose is available for this compound, and no suitable surrogate compound was identified.

Table B-6

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Earthwork Construction Workers (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2) RG$_{nc}$ Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2) RG$_c$ Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Primary VOCs			
Tetrachloroethene	0 - 3	18	6.4
	3 - 30	18	6.4
	30 - 60	18	6.4
1,1,1-trichloroethane	0 - 3	290	-- (3)
	3 - 30	290	-- (3)
	30 - 60	290	-- (3)
Trichloroethene	0 - 3	43	0.72
	3 - 30	43	0.72
	30 - 60	43	0.72
cis-1,2-dichloroethene	0 - 3	16	-- (3)
	3 - 30	16	-- (3)
	30 - 60	16	-- (3)
1,1-dichloroethene	0 - 3	16	-- (3)
	3 - 30	16	-- (3)
	30 - 60	16	-- (3)
Secondary VOCs			
1,1-dichloroethane	0 - 3	130	22
	3 - 30	130	22
	30 - 60	130	22
1,2-dichloroethane	0 - 3	200	2.5
	3 - 30	200	2.5
	30 - 60	200	2.5
trans-1,2-dichloroethene	0 - 3	22	-- (3)
	3 - 30	22	-- (3)
	30 - 60	22	-- (3)
Vinyl Chloride	0 - 3	19	0.23
	3 - 30	19	0.23
	30 - 60	19	0.23
Bromomethane	0 - 3	1.4	-- (3)
	3 - 30	1.4	-- (3)
	30 - 60	1.4	-- (3)
Chloroform	0 - 3	140	8.7
	3 - 30	140	8.7
	30 - 60	140	8.7

Table B-6

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Earthwork Construction Workers (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2) RG$_{nc}$ Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2) RG$_c$ Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Secondary VOCs			
Trichlorofluoromethane	0 - 3	290	-- (3)
	3 - 30	290	-- (3)
	30 - 60	290	-- (3)
Benzene	0 - 3	20	1.2
	3 - 30	20	1.2
	30 - 60	20	1.2
Toluene	0 - 3	160	-- (3)
	3 - 30	160	-- (3)
	30 - 60	160	-- (3)
Ethylbenzene	0 - 3	1,200	-- (3)
	3 - 30	1,200	-- (3)
	30 - 60	1,200	-- (3)
Total Xylenes	0 - 3	360	-- (3)
	3 - 30	360	-- (3)
	30 - 60	360	-- (3)
Non-VOCs			
Metals and Cyanide			
Chromium	0 - 3	4,400	3,000
	3 - 30	4,400	3,000
	30 - 60	4,400	3,000
Hexavalent Chromium	0 - 3	640	430
	3 - 30	640	430
	30 - 60	640	430
Copper	0 - 3	7,700	-- (3)
	3 - 30	7,700	-- (3)
	30 - 60	7,700	-- (3)
Lead	0 - 3	740 (4)	--
	3 - 30	740 (4)	--
	30 - 60	740 (4)	--
Nickel	0 - 3	3,700	240,000
	3 - 30	3,700	240,000
	30 - 60	3,700	240,000

Table B-6

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Earthwork Construction Workers (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2) RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2) RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
Non-VOCs			
Metals and Cyanide			
Zinc	0 - 3	63,000	-- (3)
	3 - 30	63,000	-- (3)
	30 - 60	63,000	-- (3)
Cyanide	0 - 3	4,200	-- (3)
	3 - 30	4,200	-- (3)
	30 - 60	4,200	-- (3)
Semi-Volatile Organic Compounds			
Chrysene	0 - 3	-- (5)	130
	3 - 30	-- (5)	130
	30 - 60	-- (5)	130
Phenanthrene	0 - 3	37,000	-- (3)
	3 - 30	37,000	-- (3)
	30 - 60	37,000	-- (3)
Pyrene	0 - 3	4,300	-- (3)
	3 - 30	4,300	-- (3)
	30 - 60	4,300	-- (3)

Abbreviations

-- not calculated
mg/kg milligrams per kilogram
VOC volatile organic compound

Notes

(1) Human health toxicity values and physical exposure parameters used in calculating screening levels are summarized in Tables B-1through B-4. Remediation goals assume a non-carcinogenic target risk level that corresponds to a hazard index of 1 for an individual chemical and a carcinogenic target risk level of one-in-one million (i.e., 10^{-6}) incremental risk of an individual developing cancer from exposure to an individual chemical.

(2) These remediation goals for soil calculated through use of equations presented in EKI's *Remedial Investigation Report*, dated 7 February 2003.

(3) U.S. EPA and California Environmental Protection Agency Office of Environmental Health Hazard Assessment do not classify compound as a potential carcinogen.

(4) Remediation goal for lead calculated using DTSC Lead Spread Version 7.0 computer model.

(5) No published chronic reference dose is available for this compound, and no suitable surrogate compound was identified.

Table B-7

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Maintenance Personnel (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2)	
		RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Primary VOCs			
Tetrachloroethene	0 - 3	100	1.0
	3 - 30	100	1.0
	30 - 60	100	1.0
1,1,1-trichloroethane	0 - 3	1,700	-- (3)
	3 - 30	1,700	-- (3)
	30 - 60	1,700	-- (3)
Trichloroethene	0 - 3	190	2.1
	3 - 30	190	2.1
	30 - 60	190	2.1
cis-1,2-dichloroethene	0 - 3	91	-- (3)
	3 - 30	91	-- (3)
	30 - 60	91	-- (3)
1,1-dichloroethene	0 - 3	99	-- (3)
	3 - 30	99	-- (3)
	30 - 60	99	-- (3)
Secondary VOCs			
1,1-dichloroethane	0 - 3	770	3.8
	3 - 30	770	3.8
	30 - 60	770	3.8
1,2-dichloroethane	0 - 3	1,200	0.43
	3 - 30	1,200	0.43
	30 - 60	1,200	0.43
trans-1,2-dichloroethene	0 - 3	120	-- (3)
	3 - 30	120	-- (3)
	30 - 60	120	-- (3)
Vinyl Chloride	0 - 3	110	0.040
	3 - 30	110	0.040
	30 - 60	110	0.040
Bromomethane	0 - 3	8.3	-- (3)
	3 - 30	8.3	-- (3)
	30 - 60	8.3	-- (3)
Chloroform	0 - 3	790	1.5
	3 - 30	790	1.5
	30 - 60	790	1.5

Table B-7

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Maintenance Personnel (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2): RG_{nc} Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2): RG_c Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
VOCs			
Secondary VOCs			
Trichlorofluoromethane	0 - 3	1,700	-- (3)
	3 - 30	1,700	-- (3)
	30 - 60	1,700	-- (3)
Benzene	0 - 3	120	0.20
	3 - 30	120	0.20
	30 - 60	120	0.20
Toluene	0 - 3	950	-- (3)
	3 - 30	950	-- (3)
	30 - 60	950	-- (3)
Ethylbenzene	0 - 3	7,000	-- (3)
	3 - 30	7,000	-- (3)
	30 - 60	7,000	-- (3)
Total Xylenes	0 - 3	2,100	-- (3)
	3 - 30	2,100	-- (3)
	30 - 60	2,100	-- (3)
Non-VOCs			
Metals and Cyanide			
Chromium	0 - 3	26,000	1,900
	3 - 30	26,000	1,900
	30 - 60	26,000	1,900
Hexavalent Chromium	0 - 3	3,800	270
	3 - 30	3,800	270
	30 - 60	3,800	270
Copper	0 - 3	49,000	-- (3)
	3 - 30	49,000	-- (3)
	30 - 60	49,000	-- (3)
Lead	0 - 3	740 (4)	--
	3 - 30	740 (4)	--
	30 - 60	740 (4)	--
Nickel	0 - 3	15,000	7,300
	3 - 30	15,000	7,300
	30 - 60	15,000	7,300

Table B-7

Site-Specific Human Health Remediation Goals For Chemicals of Concern in Soil to Protect Maintenance Personnel (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Direct Contact (2) RG$_{nc}$ Non-Carcinogenic Remediation Goal at HI = 1 (mg/kg)	Direct Contact (2) RG$_c$ Carcinogenic Remediation Goal at Risk = 10^{-6} (mg/kg)
Non-VOCs			
Metals and Cyanide			
Zinc	0 - 3	400,000	-- (3)
	3 - 30	400,000	-- (3)
	30 - 60	400,000	-- (3)
Cyanide	0 - 3	24,000	-- (3)
	3 - 30	24,000	-- (3)
	30 - 60	24,000	-- (3)
Semi-Volatile Organic Compounds			
Chrysene	0 - 3	-- (6)	14
	3 - 30	-- (6)	14
	30 - 60	-- (6)	14
Phenanthrene	0 - 3	150,000	-- (3)
	3 - 30	150,000	-- (3)
	30 - 60	150,000	-- (3)
Pyrene	0 - 3	16,000	-- (3)
	3 - 30	16,000	-- (3)
	30 - 60	16,000	-- (3)

Abbreviations

-- not calculated
mg/kg milligrams per kilogram
VOC volatile organic compound

Notes:

(1) Human health toxicity values and physical exposure parameters used in calculating remediation goals are summarized in Tables B-1 through B-4. Remediation goals assume a non-carcinogenic target risk level that corresponds to a hazard index of 1 for an individual chemical and a carcinogenic target risk level of one-in-one million (i.e., 10^{-6}) incremental risk of an individual developing cancer from exposure to an individual chemical.

(2) These remediation goals have been calculated through use of equations presented in EKI's *Remedial Investigation Report*, dated 7 February 2003.

(3) U.S. EPA and California Environmental Protection Agency Office of Environmental Health Hazard Assessment do not classify compound as a potential carcinogen.

(4) Remediation goal for lead calculated using DTSC Lead Spread Version 7.0 computer model.

(5) No published chronic reference dose is available for this compound, and no suitable surrogate compound was identified.

Table B-8

Summary of Site-Specific Remediation Goals
for Chemicals of Concern in Soil (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goals (2) (3) (4) Soil (mg/kg)	Groundwater Protection Remediation Goals (2) (3) (4) Soil Gas (µg/L)	Human Health Remediation Goals (4) Direct Contact (5) Soil (mg/kg)	Human Health Remediation Goals (4) Direct Contact (5) Soil Gas (µg/L)	Human Health Remediation Goals (4) Vapor Intrusion (6) Soil (mg/kg)	Human Health Remediation Goals (4) Vapor Intrusion (6) Soil Gas (µg/L)
VOCs							
Primary VOCs							
Tetrachloroethene	0 - 3	3.7	5,200	1.0	1,400	0.28	380
	3 - 30	0.045	63	1.0	1,400	0.031	43
	30 - 60	0.011	15	1.0	1,400	0.028	38
1,1,1-trichloroethane	0 - 3	69	89,000	290	370,000	350 (7)	450,000
	3 - 30	0.85	1,100	290	370,000	65	83,000
	30 - 60	0.21	270	290	370,000	58	75,000
Trichloroethene	0 - 3	2.8	4,700	0.72	1,200	0.82	1,300
	3 - 30	0.036	60	0.72	1,200	0.091	150
	30 - 60	0.0088	14	0.72	1,200	0.082	130
cis-1,2-dichloroethene	0 - 3	2.4	4,100	16	27,000	20	35,000
	3 - 30	0.043	73	16	27,000	2.3	3,900
	30 - 60	0.0094	16	16	27,000	2.0	3,500
1,1-dichloroethene	0 - 3	1.3	5,500	16	65,000	41	170,000
	3 - 30	0.016	68	16	65,000	4.5	19,000
	30 - 60	0.0043	18	16	65,000	4.1	17,000
Secondary VOCs							
1,1-dichloroethane	0 - 3	1.7	3,800	3.8	8,400	1.0	2,200
	3 - 30	0.028	61	3.8	8,400	0.11	250
	30 - 60	0.0062	14	3.8	8,400	0.10	220
1,2-dichloroethane	0 - 3	0.17	370	0.43	950	0.078	170
	3 - 30	0.0080	18	0.43	950	0.0086	19
	30 - 60	0.0014	3.0	0.43	950	0.0078	17
trans-1,2-dichloroethene	0 - 3	3.6	9,500	22	56,000	41	110,000
	3 - 30	0.048	120	22	56,000	4.5	12,000
	30 - 60	0.012	33	22	56,000	4.1	11,000
Vinyl Chloride	0 - 3	0.089	430	0.040	200	0.021	100
	3 - 30	0.0011	5.4	0.040	200	0.0023	10
	30 - 60	0.00030	1.5	0.040	200	0.0021	10
Bromomethane	0 - 3	2.5	7,100	1.4	4,200	2.9	8,400
	3 - 30	0.037	110	1.4	4,200	0.32	940
	30 - 60	0.0085	25	1.4	4,200	0.29	840
Chloroform	0 - 3	32	48,000	1.5	2,300	0.31	470
	3 - 30	0.57	860	1.5	2,300	0.034	52
	30 - 60	0.13	200	1.5	2,300	0.031	47
Trichlorofluoromethane	0 - 3	77	98,000	240 (7)	310,000	240 (7)	310,000
	3 - 30	0.96	1,200	240 (7)	310,000	45	58,000
	30 - 60	0.12	150	240 (7)	310,000	41	52,000

Table B-8

Summary of Site-Specific Remediation Goals for Chemicals of Concern in Soil (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goals (2) (3) (4)		Human Health Remediation Goals (4)			
				Direct Contact (5)		Vapor Intrusion (6)	
		Soil (mg/kg)	Soil Gas (µg/L)	Soil (mg/kg)	Soil Gas (µg/L)	Soil (mg/kg)	Soil Gas (µg/L)
VOCs							
Secondary VOCs							
Benzene	0 - 3	0.43	770	0.20	350	0.057	100
	3 - 30	0.0064	11	0.20	350	0.0064	11
	30 - 60	0.0015	2.7	0.20	350	0.0057	10
Toluene	0 - 3	120	130,000	160	180,000	170	190,000
	3 - 30	1.6	1,700	160	180,000	19	21,000
	30 - 60	0.38	420	160	180,000	17	19,000
Ethylbenzene	0 - 3	52 (7)	40,000	52 (7)	40,000	52 (7)	40,000
	3 - 30	11	8,500	52 (7)	40,000	52 (7)	40,000
	30 - 60	2.6	2,000	52 (7)	40,000	52 (7)	40,000
Total Xylenes	0 - 3	58 (7)	30,000	58 (7)	30,000	58 (7)	30,000
	3 - 30	30	16,000	58 (7)	30,000	45	24,000
	30 - 60	7.1	3,700	58 (7)	30,000	41	21,000
Non-VOCs							
Petroleum Hydrocarbons							
Total Extractable Petroleum Hydrocarbons	0 - 3	--	--	1,000 (8)	--	--	--
	3 - 30	--	--	1,000 (8)	--	--	--
	30 - 60	--	--	1,000 (8)	--	--	--
Metals and Cyanide							
Chromium	0 - 3	--	--	1,900	--	--	--
	3 - 30	--	--	1,900	--	--	--
	30 - 60	--	--	1,900	--	--	--
Hexavalent Chromium	0 - 3	7.6	--	270	--	--	--
	3 - 30	1.1	--	270	--	--	--
	30 - 60	0.99	--	270	--	--	--
Copper	0 - 3	--	--	7,700	--	--	--
	3 - 30	--	--	7,700	--	--	--
	30 - 60	--	--	7,700	--	--	--
Lead	0 - 3	--	--	740 (9)	--	--	--
	3 - 30	--	--	740 (9)	--	--	--
	30 - 60	--	--	740 (9)	--	--	--
Nickel	0 - 3	--	--	3,700	--	--	--
	3 - 30	--	--	3,700	--	--	--
	30 - 60	--	--	3,700	--	--	--
Zinc	0 - 3	--	--	63,000	--	--	--
	3 - 30	--	--	63,000	--	--	--
	30 - 60	--	--	63,000	--	--	--

Table B-8

Summary of Site-Specific Remediation Goals for Chemicals of Concern in Soil (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Chemical of Concern	Depth (ft bgs)	Groundwater Protection Remediation Goals (2) (3) (4)		Human Health Remediation Goals (4)			
				Direct Contact (5)		Vapor Intrusion (6)	
		Soil (mg/kg)	Soil Gas (µg/L)	Soil (mg/kg)	Soil Gas (µg/L)	Soil (mg/kg)	Soil Gas (µg/L)
Non-VOCs							
Metals and Cyanide							
Cyanide	0 - 3	--	--	4,200	--	--	--
	3 - 30	--	--	4,200	--	--	--
	30 - 60	--	--	4,200	--	--	--
Semi-Volatile Organic Compounds							
Chrysene	0 - 10	1,000,000	11,000	14	0.15	15	0.16
	10 - 35	21,000	220	14	0.15	110	1.2
	35 - 60	330	3.5	14	0.15	940	10
Phenanthrene	0 - 10	1,000,000	8,600	37,000	320	74,000	640
	10 - 35	1,000,000	8,600	37,000	320	280,000	2,400
	35 - 60	30,000	260	37,000	320	1,000,000	8,600
Pyrene	0 - 10	1,000,000	4,700	4,300	20	14,000	66
	10 - 35	880,000	4,100	4,300	20	96,000	450
	35 - 60	1,900	8.9	4,300	20	840,000	3,900

Table B-8

Summary of Site-Specific Remediation Goals for Chemicals of Concern in Soil (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

--	not calculated
ft bgs	feet below ground surface
mg/kg	milligrams per kilogram
µg/L	micrograms per liter
VOC	volatile organic compound

Notes

(1) Human health toxicity values and physical exposure parameters used in calculating remediation goals are summarized in Tables B-1 through B-4. Human health remediation goals assume a non-carcinogenic target risk level that corresponds to a hazard index of 1 for an individual chemical and a carcinogenic target risk level of one-in-one million (i.e., 10^{-6}) incremental risk of an individual developing cancer from exposure to an individual chemical.

(2) Groundwater protection remediation goals were calculated through use of U.S. EPA VLEACH vadose zone leaching computer model to maintain chemical concentrations in groundwater beneath an area of 4,000 square feet at or below Maximum Contaminant Levels, unless otherwise noted. This area is assumed to be typical of an area of possible chemical release at the Site. The soil concentration indicated is the lower of either the remediation goal calculated in Table x-3 or the estimated soil saturation concentration. The soil gas concentration indicated is that calculated to be in equilibrium with the given soil concentration.

(3) Groundwater protection remediation goals do not take into account possible recontamination of soil from VOCs volatilizing from groundwater. VOCs may be migrating in groundwater onto the Price Pfister property as a result of chemical releases at Holchem or potentially other nearby facilities. Attainment of groundwater protection remediation goals may not be feasible given regional groundwater contamination.

(4) Certain remediation goals might be below the range of typical analytical method reporting limits for VOCs and hexavalent chromium. In such cases, the remediation goals may be the desirable cleanup levels, but attainment can only be determined at the standard analytical method reporting limits. Actual analytical method reporting limits determining attainment with remedial action objectives will be established at the time of confirmation sampling and will consider such factors as whether matrix interferences exist in the samples that necessitate raising the standard analytical method reporting limits.

(5) These remediation goals have been calculated through use of equations presented in EKI's*Remedial Investigation Report*, dated 7 February 2003. The soil concentration indicated for each chemical is the lowest of the goals calculated for each of the potentially exposed populations at the Site presented in Tables B-6 and B-7 and the estimated soil saturation concentration. The soil gas concentration indicated for volatile compounds is that calculated to be in equilibrium with the given soil concentration.

(6) These remediation goals have been calculated through use of U.S. EPA Johnson and Ettinger vapor intrusion computer model. Remediation goals for vapor intrusion were calculated only for those compounds considered to be volatile. Volatile compounds are defined to be chemicals that have Henry's Law constants greater than 10^{-5} atmospheres-cubic meters per mole and molecular weights less than 200 grams per mole. The soil concentration listed is the lowest of the remediation goals presented in Table B-5 andthe estimated soil saturation concentration. The soil gas concentration indicated for VOCs and semi-volatile organic compounds is that calculated to be in equilibrium with the concentration of chemical in soil calculated to be protective of all potentially exposed populations at the Site.

Table B-8

Summary of Site-Specific Remediation Goals for Chemicals of Concern in Soil (1)

Price Pfister Inc., 13500 Paxton Street, Pacoima, California

Notes

(7) The soil concentration indicated is the soil saturation concentration because it was lower than the calculated remediation goal. Soil saturation concentration for COCs are calculated using the equation from *U.S. EPA, 1 November 2000, Region 9 Preliminary Remediation Goals (PRGs) 1999 Memorandum from Stanford J. Smucker, Ph.D., Regional Toxicologist (SFD-8-B), Technical Support Team*. Values of site-specific physical parameters used to calculate soil saturation concentrations are summarized in Table B-1.

(8) Because no published toxicity values exist for petroleum hydrocarbons, the direct contact remediation goal forpetroleum hydrocarbons is assumed equivalent to the Soil Screening Level of 1,000 mg/kg established by the Regional Water Quality Control Board, Los Angeles Region for petroleum hydrocarbons with carbon chain lengths of C_{13} to C_{22} in soil that is 20 to 150 feet above the groundwater surface.

(9) Remediation goal for lead calculated using DTSC Lead Spread Version 7.0 computer model.

APPENDIX C

SCREENING OF GENERAL RESPONSE ACTIONS, TECHNOLOGIES, AND PROCESS OPTIONS

LIST OF TABLES

APPENDIX C

SCREENING OF GENERAL RESPONSE ACTIONS, TECHNOLOGIES, AND PROCESS OPTIONS

The United States Environmental Protection Agency ("U.S. EPA") (1988a) considers general response actions to be those actions that will satisfy remedial action objectives ("RAOs") established for a site. General response actions are divided into remedial technologies, which themselves are divided into process options. Remedial technologies refer to general categories of technologies, such as capping, subsurface barriers, or extraction. Process options refer to specific processes within each category of remedial technology. For example, extraction remedial technology would include the process options of using wells or trenches to remove groundwater from the subsurface. Several broad types of remedial technologies may be identified for each general response action, and numerous process options may exist for each category of remedial technology.

As described in Section 8 of this report, general response actions, technologies, and process options for the Price Pfister property were evaluated against the short- and long-term aspects of effectiveness, implementability, and cost as described under the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP") at Part 40 of the Code of Federal Regulations ("CFR") §300.430(e)(7). The evaluation of general response actions, remedial technologies, and process options based upon these three criteria is provided in Sections C.1 through C.13.

C.1 NO ACTION

The NCP at 40 CFR §300.430(e)(6) requires that the "no action" alternative be evaluated as a baseline for comparison of other alternatives developed. The no action alternative may be appropriate for selection under certain circumstances. U.S. EPA (1991f) states the following regarding the need to implement remedial actions at a site:

> If the baseline risk assessment and the comparison of exposure concentrations to chemical-specific standards indicates that there is no unacceptable risk to human health or the environment and that no remedial action is warranted, then the CERCLA Section 121 cleanup standards for selection of a Superfund remedy, including the requirement to meet

applicable or relevant and appropriate requirements (ARARs), are not triggered.

The no action alternative for soil will not achieve RAOs at those areas of the Site with chemicals of concern ("COCs") in soil greater than screening levels for unrestricted use (e.g., U.S. EPA Region IX preliminary remediation goals for residential soil) or that have identified impacts to groundwater because this alternative does not include institutional controls to limit land and groundwater use. The no action alternative can be easily implemented and costs are negligible because no further activities need to be performed. The NCP at 40 CFR §300.430(e)(6) requires that the no action alternative be evaluated as a baseline for comparison of other alternatives assembled. This general response action is retained for further consideration.

C.2 INSTITUTIONAL CONTROLS

Institutional controls are non-engineering measures designed to limit exposure to hazardous substances left in-place or to ensure the effectiveness of the chosen remedy. Institutional controls that may be applicable to the Site consist of land and groundwater use restrictions and a requirement to comply with the RMP, which may include provisions for soil and groundwater management, maintenance of existing cover or construction of new cover, mitigation measures during earthwork, management of below grade structures, etc.

It is envisioned that the Price Pfister property will be redeveloped for industrial and/or commercial purposes. The remedial actions described in this RAP are intended to protect human health and the environment based upon these reasonably anticipated land uses. The remedial actions may not be sufficiently protective if the Site were to be redeveloped for other uses such as residential housing. Accordingly, institutional controls are an integral component of all remedial actions to ensure that the anticipated land uses remain compatible with the remedial actions that are implemented at the Site.

Institutional controls include land use restrictions, which can also be referred to as deed restrictions. Deed restrictions and land use restrictions are general phrases for legal controls such as easements and restrictive covenants. These controls can prohibit certain kinds of site uses or notify potential owners or tenants of the presence of hazardous substances remaining on-site at concentrations that are not protective of all uses. For such alternatives to be protective, U.S. EPA (1995) states:

> ...it is essential that the alternative include components that will ensure that it remain protective. In particular, institutional controls will generally have to be included in the alternative to prevent an unanticipated change in land use that could result in unacceptable exposures to residual contamination, or, at a minimum, alert future users to the residual risks and monitor for any change in site use.

The NCP does not expect institutional controls to constitute the only remedial action implemented at most sites. At 40 CFR §300.430(a)(1)(iii)(D), the NCP states the following:

> The use of institutional controls shall not substitute for active response measures (e.g., treatment and/or containment of source material, restoration of ground waters to their beneficial uses) as the sole remedy unless such active measures are determined not be practicable, based on the balancing of trade-offs among alternatives that is conducted during the selection of the remedy.

Institutional controls are included as a component of all remedial alternatives evaluated in this RAP, with the exception of the no action alternative described in Section 9.1.1. Institutional controls will restrict the Site to commercial and industrial uses, prevent the use of groundwater, and obligate owners and tenants of the Site to implement the procedures specified in the RMP and to update information in the RMP as appropriate. The institutional controls also require the maintenance of existing cover or construction of new cover at the Site if the existing cover is removed. Institutional controls are easily implemented, and of low capital cost and low to moderate annual cost. Institutional controls are retained for further consideration.

C.3 MONITORING

Monitoring is an important component of remedial actions where residual COCs may be left above applicable remediation goals in soil or groundwater. Groundwater sampling, or monitored natural attenuation ("MNA"), can be an appropriate groundwater remedial action at specific locations. However, monitoring alone is not a remedial alternative. Monitoring is an evaluation tool or data gathering activity to demonstrate the effectiveness of the selected remedies over time. Monitoring is essential to confirm that land use restrictions are performing as intended. If a cover system is placed over a hazardous substance release site, monitoring is needed to assess if digging beneath the cover is taking place and, if so, whether it is being conducted in such a manner that minimizes potential risk to human health and the environment. The RMP (Appendix A) for the Price Pfister property specifies details concerning monitoring of land use restrictions.

Monitoring may also entail ongoing soil or groundwater sampling to assess the impacts on environmental conditions of residual COCs at the areas of concern ("AOCs"), which consist of the Central Building P Area, Building A Area, Oil Staging Area, and Building L Area. Routine groundwater sampling, in particular, is anticipated to be a component of preferred remedial actions for the Central Building P Area, Building A Area, and Oil Staging Area. After addressing source material in soil at these AOCs, MNA may be an appropriate groundwater remedial action. U.S. EPA (1999b) defines MNA as the following:

> …the reliance on natural attenuation processes (within the context of a carefully controlled and monitored site cleanup approach) to achieve site-specific remediation objectives within a time frame that is reasonable compared to that offered by other more active methods. The "natural attenuation processes" that are at work in such a remediation approach include a variety of physical, chemical, or biological processes that, under favorable conditions, act without human intervention to reduce the mass, toxicity, mobility, volume, or concentration of contaminants in soil and groundwater. These *in-situ* processes include biodegradation; dispersion; dilution; sorption; volatilization; radioactive decay; and chemical or biological stabilization, transformation, or destruction of contaminants.

U.S. EPA (1999b) stresses that source control and long-term performance monitoring will be fundamental components of any MNA remedy. MNA is an appropriate remedial action for the Price Pfister property if its use protects human health and the environment, and is capable of achieving RAOs within a time frame that is reasonable compared to other alternatives. Monitoring of groundwater and soil vapor has been ongoing at the Site and is easily implemented. Capital costs associated with monitoring wells are estimated to be low to moderate with moderate annual costs. Monitoring is retained for further consideration.

C.4 CONTAINMENT

Containment refers to the use of capping technologies or engineered cover systems to minimize contact of wastes and COCs in soil by humans and ecological receptors.

Containment remedies are compatible with anticipated land uses for the Price Pfister property. Containment is a "presumptive remedy" for soil with metals that pose a low-level threat (U.S. EPA, 1999a).[3]

Permeable cover systems are not designed to restrict the infiltration of surface water. Permeable covers exist at the Price Pfister property and consist of building slabs, asphalt roadways, and concrete pavement. Such features will continue to be maintained or will be replaced with improvements constructed during redevelopment.

Low-permeability cover systems are often designed to promote surface water drainage away from the cover and to reduce infiltration of water into the soil containing COCs. However, the low moisture content measured in soil at the Price Pfister property demonstrates that the existing permeable covers at the Site are sufficient to prevent surface water from infiltrating into soil and leaching volatile organic compounds ("VOCs") to groundwater. Although low-permeability cover systems may find utility at the Site as a barrier against vapor intrusion, it is recommended that they not be relied upon solely to accomplish this objective because it may be difficult to detect gaps or penetrations through the barrier that would compromise the effectiveness of the barrier. If low-permeability cover systems are used to mitigate the vapor intrusion pathway, low-permeability cover systems should be installed in combination with SVE or sub-slab depressurization ("SSD") systems that provide a more verifiable means of control.

Regardless of the type of cover system selected, institutional controls and ongoing maintenance activities are likely to be included as part of the containment remedy to ensure its long-term protectiveness. The RMP (Appendix A) for the Site describes the inspection frequencies, repair methods, and other protocols to protect cover systems required at the Price Pfister property.

Cover systems for the Site are easily implemented and the capital costs associated with the permeable cover systems are anticipated to be low because the existing permeable cover systems either will be maintained or will be replaced with improvements to be

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[3] Presumptive remedies are preferred response actions or technologies for sites with similar characteristics. U.S. EPA identifies presumptive remedies based upon information acquired from evaluating and cleaning up sites under Superfund. A primary reason for U.S. EPA establishing presumptive remedies is to streamline remedy selection by narrowing the universe of technologies and alternatives that must be considered. U.S. EPA also believes that presumptive remedies will produce the added benefit of promoting consistency in remedy selection and improving the predictability of the remedy selection process for communities and potentially responsible parties. A simpler and less technical discussion of presumptive remedies can be found in U.S. EPA's (1997b) *A Citizen's Guide to Understanding Presumptive Remedies.*

constructed irrespective of environmental conditions at the Price Pfister property. Capital cost to install low-permeability cover systems as vapor barriers under new buildings may be low to moderate. Annual costs of inspecting and maintaining permeable or low-permeability cover systems are anticipated to be low. Permeable are included as elements of the RMP. Low-permeability covers are included as potential elements of the RMP.

C.5 IN-SITU SOIL TREATMENT

In-situ soil treatment consists of remedial technologies that destroy COCs or reduce their toxicity, mobility, or volume without first having to excavate the wastes or affected soil. With these technologies, soil is treated in-place, which can minimize waste generation. In-situ soil treatment consists of physical/chemical, thermal, and biological remedial technologies.

C.5.1 In-situ Soil Treatment Using Physical/Chemical Technology

Soil flushing, immobilization, soil vapor extraction, sub-slab depressurization, and electrokinetics are the process options considered in this RAP that use physical/chemical technology for in-situ treatment of soil.

C.5.1.1 Soil Flushing

Soil flushing involves injecting an aqueous solution to remove COCs from the subsurface without first having to excavate the wastes or affected soil. COCs are liberated from or transformed in soil if they are soluble, create an emulsion, or react with the solution injected into the subsurface. After passing through the affected soil, the aqueous solution is collected by strategically placed extraction wells, and brought to the surface for disposal, recirculation, or on-site treatment and reinjection.

Soil flushing is an emerging physical/chemical process that has not been demonstrated for full-scale application (Smith, et al, 1995). Complete recovery of the aqueous solution used to wash soil has been found to be extremely difficult. Additionally, recovery of in-situ fluid is difficult and can be of moderate to high capital cost and moderate annual cost. Soil flushing is not retained for further consideration because other suitable and more reliable processes exist for removing or treating COCs detected in soil at the Site.

C.5.1.2 Immobilization

Immobilization refers to mixing chemical reagents with wastes or COC-containing soil to change the toxicity, or physical or leaching characteristics of these materials through solidification and stabilization processes. Solidification entails physically locking COCs within a solidified matrix in the form of a crumbly soil-like mixture or a monolithic block. Stabilization converts COCs to an immobile form, typically by chemical reaction. Immobilization is a presumptive remedy for soil with metals that pose a principal threat (U.S. EPA, 1999a).

A significant challenge for successfully accomplishing immobilization in-situ is uniform mixing of chemical reagents with the impacted soil (U.S. EPA, 1991c). Building L is the only AOC that has significant metal contamination. Metal contamination at Building L consists of a 1- to 18-inch layer of black sand and soil immediately below the existing pavement. Metal-containing black sand and soil are more easily and cost-effectively addressed through excavation and disposal at an off-Site, permitted waste management facility with solidification/stabilization of the material performed at the facility if needed to meet federal land disposal restrictions ("LDRs"). In-situ immobilization is not retained for further consideration.

C.5.1.3 Soil Vapor Extraction

SVE is a process for removing volatile contaminants from soil in the unsaturated zone, by installing one or more extraction wells in the contaminated soil and applying a vacuum to these wells ton induce air flow through the soil and into the well. VOCs volatilize as air moves through the soil, and VOC-laden air is captured by the SVE extraction wells for off-gas treatment or discharge to the atmosphere. Common off-gas treatment systems include granular activated carbon ("GAC") adsorption, and thermal or catalytic oxidation. SVE can also serve as a barrier to vapor intrusion for buildings at the Site.

SVE generally does not address non-volatile chemicals, such as metals or higher molecular weight petroleum hydrocarbons. Therefore, U.S. EPA states that SVE should be considered for locations with a mixture of VOCs and non-volatile contaminants only if it can be used in combination with other remedies.

SVE systems were installed at the Central Building P Area and Oil Staging Area of the Site in September 2002 and have proved effective in capturing significant contaminant mass and reducing detectable concentrations of VOCs across the Site. In six months of operation, approximately 1,800 pounds of VOC have been recovered, most of this mass being tetrachloroethene ("PCE"), and concentrations of PCE in soil gas have been substantially reduced. SVE has been effective at the Site and is retained for further consideration.

C.5.1.4 Sub-slab Depressurization

SSD technology is based on the same principles as SVE. However, the design objective of SSD is not to remediate contaminated soil but to prevent soil gases from infiltrating into a building. An active SSD system is operated continuously to create a slight vacuum beneath the concrete foundation slab of the building. The induced vacuum beneath the building foundation slab overcomes the lower pressure that often exists inside a building thereby preventing soil gas from flowing into the building.

An active SSD system requires installation of vent piping in one or more central, or other appropriately selected locations in the aggregate layer beneath the foundation slab. The vent piping is connected to a small blower or wind-driven turbine to create the vacuum beneath the foundation slab. The vacuum beneath the building foundation must be sufficient to overcome the lower pressure inside the building. Soil gas withdrawn from the vent piping beneath the building is treated to remove VOCs and is subsequently discharged to the atmosphere. The discharge stack of the SSD treatment facility should be sufficiently far from the intakes of mechanical ventilation systems to avoid transferring treated soil gas into buildings. Applicable building codes should be consulted to determine the necessary clearance for mechanical ventilation system intakes.

U.S. EPA (1994, 1993e) has long recognized the value of SSD in reducing airborne radon concentrations inside residences and commercial buildings. SSD has been adapted at numerous sites across the United States to mitigate VOC vapor intrusion risks. The Massachusetts Department of Environmental Protection (1995) states that "SSD systems are a proven, effective, and economical means for intercepting subsurface vapors that would otherwise infiltrate into a structure of concern. These systems have been successfully installed and operated in residential, commercial, and school buildings throughout Massachusetts." SSD systems could be used together with low-permeability covers as vapor barriers. SSD is included as a potential element of the RMP.

C.5.1.5 Electrokinetics

Electrokinetics has been proposed to remove metals and other COCs from soil and groundwater by applying an electric field in the subsurface. The process reportedly works by using a charged electric field to induce movement of ions, particulates, and water through soil (Hinchee et al, 1989). The electric field is applied through anodes and cathodes placed in the soil. Most metals form positively charged ions that migrate towards the negatively charged electrode, or cathode.

A conductive solution must be injected into unsaturated soil to act as a carrier for metals to the cathodes. Like soil flushing, this conductive solution must be recovered for treatment. For this reason, electrokinetics is considered most applicable to saturated soil with nearly static groundwater flow and moderate to low permeability. A low groundwater flow rate is required so that ionic diffusion rather than advective flow is the main transport mechanism. Water is required to provide a polar medium for flow of metal ions. Electrokinetics is less dependent on high soil permeability than soil flushing because electrokinetic separation occurs due to ionic migration rather than bulk fluid flow. Fine-grained soil, such as clay and silt, are reported to be a good medium for electrokinetics (U.S. EPA, 1992a). Heterogeneities or anomalies found at sites, such as building foundations, rubble, significant quantities of iron or iron oxides, large rocks, or gravel may reduce the efficiency of metal removal (Acar et al, 1995).

Soil at the Site consists of highly permeable sandy gravels and gravelly sands, making conditions at the Site unsuitable for the successful application of electrokinetics. In addition, electrokinetics is still in the development phase and is considered an unproven technology. Electrokinetics is not retained for further consideration because other suitable and more reliable processes exist for removing or treating COCs detected in soil at the Site.

C.5.2 In-situ Soil Treatment Using Thermal Technology

Vitrification is the only process option considered in this RAP that uses thermal technology for in-situ treatment of soil. Vitrification converts affected soil into a stable glass or crystalline monolith. Vitrification is based on electric melter technology, and the principle of operation is joule heating, which occurs when an electrical current is passed through a region that behaves like a resistive element. Electric current is applied through an array of electrodes inserted vertically into the zone of affected soil. Because dry soil is not conductive, flaked graphite and glass frit is placed in a small trench between the electrodes to act as the starter path for the flow of electricity. Electricity in the starter path transfers heat that melts the soil. The soil becomes conductive once molten. The melt grows outward and downward as electricity is continually applied. Smith et al (1995) reports that soil has been treated to a maximum depth of approximately 20 feet below ground surface ("bgs") with this process.

U.S EPA has stated that implementation of this application is limited by the availability of equipment for the technology (1999a). In-situ vitrification cannot be used for soils containing buried pipes or drums or in soils containing cobbles exceeding 20 percent by weight. The presence of gravel and cobbles in relatively large quantities in soil at the Site makes application likely unsuitable. In addition, the process is expensive to implement with costs highly dependent upon local energy rates and the characteristics of deposited wastes and soils with COCs, making treatment costs high. For these reasons, vitrification is not retained for further consideration.

C.5.3 In-situ Soil Treatment Using Biological Technology

Phytoremediation and bioremediation are the process options considered in this RAP that use biological technology for in-situ treatment of soil.

C.5.3.1 Phytoremediation

Phytoremediation involves growing plants in wastes or soil. Plants established in the impacted soil uptake COCs and incorporate the chemicals in their plant structures. Plants that have accumulated the COCs in their biomass are subsequently harvested for disposal at an off-site, permitted waste management facility. The most important limitation to phytoremediation is rooting depth, which can be 0.5, 1, or 3 ft bgs, depending on the plant and soil type. Therefore, one of the favorable site conditions for phytoremediation is that contamination be restricted to surface soil (U.S. EPA, 1997).

Lead, which is present in shallow soil at the Site, is difficult for plants to uptake. The natural growth rates of plants and the length of the growing season limits how quickly phytoremediation can uptake COCs. Therefore, the length of time to cleanup metal-containing soil may be too long to be acceptable for the planned redevelopment of the Site (U.S. EPA, 2001b). Other suitable and more reliable processes exist for removing or treating COCs detected in soil at the Site. Phytoremediation is not retained for further consideration.

C.5.3.2 Bioremediation

Bioremediation involves stimulating indigenous microorganisms, such as bacteria and fungi, to transform hazardous chemicals to less toxic or non-toxic chemicals. Oxygen, water, and nutrients are supplied to wastes or soil to promote biological transformation of petroleum hydrocarbons or other organic chemicals under aerobic (i.e., presence of oxygen) conditions. Other COCs that can be biodegraded under aerobic conditions include alcohols, phenols, esters, and ketones. Bioremediation of COCs, such as chlorinated organic solvents, may occur under anaerobic (i.e., lack of oxygen) conditions by a process referred to as reductive dechlorination. The applicability of bioremediation depends on the conditions at a site. Chlorinated organic solvents become more difficult to biodegrade under aerobic conditions as the number of chlorine atoms increases (U.S. EPA, 1991c), which makes PCE harder to degrade aerobically than many other solvents.

PCE is the primary VOC at the Site. Relatively low concentrations of reductive dechlorination transformation products of PCE are found in soil gas and groundwater samples collected at the Site. Review of available information suggests that this anaerobic biological process is not greatly affecting Site conditions. Reductive dechlorination of PCE happens under very anaerobic conditions that are not now present or anticipated in the future at the Site.

Petroleum hydrocarbons can be biologically degraded. The rate of degradation depends upon the characteristics of the petroleum hydrocarbons, the concentrations at which petroleum hydrocarbons are present in soil, and the availability of oxygen, water, and essential nutrients. As discussed in the Remedial Investigation report (EKI, 2003b), while available data suggests that microorganisms are consuming petroleum hydrocarbons in the Building A Area, the extent of transformation is probably limited by the presence of free hydrocarbon product ("FHP") in soil and groundwater at the Building A Area. Continued FHP collection is likely required to increase the rate at which petroleum hydrocarbons are biologically transformed and allow bioremediation or natural attenuation to be a viable mechanism for addressing residual petroleum hydrocarbons in the subsurface after FHP collection has been finished.

In-situ bioremediation is not suitable as a primary means of treating PCE and petroleum hydrocarbons as FHP in the subsurface at the Price Pfister property. In-situ bioremediation is not retained for further consideration.

C.6 SOIL EXCAVATION

Excavation of soil with COCs is a general response action often implemented at sites where releases of hazardous substances have occurred. Excavation is typically accomplished with earth-moving equipment, such as backhoes, bulldozers, and front loaders. Excavating and removing waste materials, waste residues, and contaminated subsoil, also known as clean closure, will eliminate potential long-term risks to humans at the Site. Although no volume limit has been established for determining the practicality of excavation, U.S. EPA (1996a, 1993b) states that landfills and sites with "a content of 100,000 cubic yards (approximately two acres, 30 feet deep) would normally not be considered for excavation." Complete removal of soil is likely to achieve applicable remediation goals for soil and can be readily implemented with standard construction equipment. Soil excavation is retained for further consideration.

C.7 EX-SITU SOIL TREATMENT

Ex-situ soil treatment requires that soil with COCs be excavated before remedial technologies that destroy COCs, or reduce their toxicity or mobility are employed. Soil is treated above ground. Ex-situ soil treatment consists of physical/chemical, thermal, and biological remedial technologies.

C.7.1 Ex-situ Soil Treatment Using Physical/Chemical Technology

Soil washing, chemical oxidation/reduction, and immobilization are the process options considered in this RAP that use physical/chemical technology for ex-situ treatment of soil.

C.7.1.1 Soil Washing

Soil washing is sometimes referred to as hydrometallurgical separation. Soil washing is a presumptive remedy for soil with metals that pose a principal threat (U.S. EPA, 1999a). The process requires intimate contact of metal-containing soil with the extraction solution. The presence of large clumps or debris interferes with good contact, so pretreatment to exclude or crush oversize material normally is required. The extraction solution is routinely treated during soil washing to remove accumulated metals. Reuse of the solution is required because the leaching chemicals in the solution tend to be expensive and the disposal cost would be prohibitive if the volume of waste extraction solution was not reduced through recycling (Smith et al, 1995).

Extraction solutions used in soil washing are specific to a limited range of metal species. Thus, most extraction solutions are effective only for a narrow range of metal and soil type combinations (U.S. EPA, 1999a). The extraction solutions may also have toxic characteristics. In addition, soil containing both metals and organic chemicals make formulating a single suitable washing solution difficult and may require sequential washing using different wash formulations. The high costs of implementation and the challenge of formulating an appropriate extraction solution make soil washing less suitable for treating COCs in soil than other available treatment technologies. Soil washing is not retained for further consideration.

C.7.1.2 Chemical Oxidation/Reduction

As described in Section C.10.1.3, chemical oxidation or reduction processes are most commonly applied to transform COCs that are dissolved in groundwater as opposed to COCs sorbed to soil. U.S. EPA has recently studied the potential applicability of chemical oxidation/reduction processes developed to destroy chemical weapons to the treatment of contaminated soil. The results of this study (U.S. EPA, 2000d) find that most chemical oxidation/reduction processes are not yet commercially available for the treatment of contaminated soil. According to U.S. EPA (2000d), the limited processes that do exist for full-scale applications appear to be permitted for treatment of PCBs only and require extensive preprocessing of soil before the PCBs can be transformed by chemical oxidation/reduction. PCBs have not been detected at the Site and are not considered COCs. Therefore, no soil exists at the Price Pfister property that is amenable to chemical oxidation/reduction treatment. Chemical oxidation/reduction is not retained for further consideration.

C.7.1.3 Immobilization

Because vigorous mixing is needed to disperse solidification or stabilization chemical reagents with affected soil, immobilization is often performed above ground. Immobilization, which is described in Section C.5.1.2, refers to processes that change the toxicity, or physical or leaching characteristics of COCs in soil by mixing chemical reagents with impacted soil.

Pretreatment is generally performed to separate and crush oversize materials, such as rocks and debris, which can interfere with mixing of chemical reagents. Mixing can be accomplished by a variety of methods, including in-drum, in-plant, or area mixing. In-drum mixing is typically used for highly toxic or small volumes of wastes, and involves combining the reagents and wastes in a small (e.g., 55-gallon) drum. In-plant mixing may consist of either continuous or batch operations. Batch operations generally use a rotary drum mixer. A rotary drum mixer is a slightly inclined vessel, usually with internal baffles, that rotates to tumble and combine the contents. Continuous operations generally involve a pug mill. A pug mill has paddles attached to a horizontal rotating shaft to accomplish mixing. Area mixing entails placing layers of reagent and soil in a bermed location and combining the layers with a backhoe or other earth-moving equipment. Area mixing differs from in-situ immobilization using earth-moving equipment in that the affected soil is excavated and moved to a bermed location for treatment. Implementation of immobilization is a function of accessibility to soils.

Immobilization may be appropriate for treatment of metals-containing soil to meet federal LDRs prior to disposal at an off-Site, permitted waste management facility. However, the relatively small volume (i.e., 1,500 cubic yards) of black sand and soil estimated to be impacted by metals at the Building L Area makes immobilization easier to implement and less expensive at an off-Site facility than attempting immobilization at the Price Pfister property. Immobilization is not retained for further consideration.

C.7.2 Ex-situ Soil Treatment Using Thermal Technology

Thermal desorption, vitrification, and incineration are the process options considered in this RAP that use thermal technology for ex-situ treatment of soil.

C.7.2.1 Thermal Desorption

Thermal desorption is any of a number of processes that use either indirect or direct heat exchange to vaporize COCs from excavated soil. Air, combustion gas, or inert gas is used as the transfer medium for the volatilized COCs. Thermal desorption systems provide physical separation and are not designed to destroy COCs. Soil is typically heated to 200 to 1,000°F depending on the thermal desorption system selected. COCs in the off-gas may be incinerated in an afterburner, adsorbed onto vapor-phase GAC, or recovered in condensation equipment. Thermal desorption has been proven effective in treating VOCs, petroleum hydrocarbons, and some semi-volatile organic compounds (U.S. EPA, 1991e). However, the process is energy intensive and requires that a large volume of soil be treated and reused on-site to justify the costs of the technology. Because more cost effective treatment technologies are available, thermal desorption is not retained for further consideration.

C.7.2.2 Vitrification

Vitrification described in Section C.5.2 can be performed ex-situ as well as in-situ. However, the availability of equipment limits implementability of vitrification (U.S. EPA, 1999a). The process is expensive to implement with costs highly dependent upon local energy rates, and the characteristics of deposited wastes and soils with COCs. For these reasons, vitrification is not retained for further consideration.

C.7.2.3 Incineration

Incineration involves burning wastes to destroy organic compounds. Incineration employs temperatures typically in the range of 1,500 to 3,000°F to convert organic compounds into water, carbon dioxide, and nitrogen oxides (Freeman, 1989). Depending upon the waste types to be destroyed, incinerators may consist of liquid-injection incinerators, rotary kilns, fluidized bed systems, hazardous waste boilers, or cement kilns. Metals are not destroyed by incineration. Metals either volatilize or remain in ash. Incineration is expensive because it is an energy-intensive process.

Due to strict air quality regulations in California, obtaining approval for on-Site incineration would be an arduous and expensive process, which makes incineration of excavated soil likely infeasible at the Site. Incineration is not retained for further consideration.

C.7.3 Ex-situ Soil Treatment Using Biological Technology

Phytoremediation and bioremediation are the process options considered in this RAP that use biological technology for in-situ treatment of soil.

C.7.3.1 Phytoremediation

Phytoremediation described in Section C.5.3.1 can be performed on excavated soil that has been transferred to a bermed location to contain water used to irrigate the plants established in the affected soilThe natural growth rates of plants and the length of the growing season limits how quickly phytoremediation can uptake COCs. Therefore, the length of time to cleanup sites may be too long to be compatible with the planned industrial/commercial redevelopment of the site (U.S. EPA, 2001b). Phytoremediation is not retained for further consideration. Other suitable and more reliable processes exist for removing or treating COCs detected in soil at the Price Pfister property.

C.7.3.2 Bioremediation

Bioremediation described in Section C.5.3.2 can be performed ex-situ as well as in-situ. However, the extended time and space required to treat petroleum hydrocarbon-containing soil excavated at the Building A Area and other locations at the Price Pfister property would most likely conflict with planned redevelopment of the Site. Ex-situ bioremedation is not retained for further consideration.

C.8 EXCAVATED SOIL MANAGEMENT

Soil that has been excavated and soil that has been excavated and treated must eventually be disposed either on-site or off-site.

C.8.1 Reuse of Soil On-Site

If excavated soil is found to have COC concentrations less than applicable remediation goals or can be treated to such levels, it may be possible to reuse such soil at the Site. If the opportunity exists for on-Site reuse, this method of soil management can be readily implemented with standard construction equipment. Reuse of excavated soil is retained for further consideration as an element of the RMP.

C.8.2 Disposal of Soil Off-Site

Off-Site disposal of soil entails directly transporting excavated material to a permitted waste management facility. Excavated soil and waste must be characterized to determine the type of waste management unit or facility that is permitted to accept the material for disposal. The State of California regulates three specific types of waste management units. These waste management units consist of Class I units that receive hazardous wastes, Class II units that receive designated wastes, and Class III units that receive non-hazardous solid wastes.

Disposal of hazardous wastes is regulated under Title 22 of the California Code of Regulations ("CCR"). Hazardous wastes are those wastes that are listed to be hazardous or exhibit hazardous characteristics as defined by the State of California Environmental Protection Agency, Department of Toxic Substances Control ("DTSC") or U.S. EPA under Resource Conservation and Recovery Act ("RCRA"). Disposal of designated and non-hazardous solid wastes is regulated under Title 27 of the CCR. Designated wastes are non-hazardous wastes that contain soluble pollutants in concentrations that exceed applicable water quality objectives or could degrade waters of the state. Non-hazardous solid wastes are defined under 27 CCR §20220 as the following:

> Nonhazardous solid waste means all putrescible and nonputrescible solid, semi-solid, and liquid wastes, including garbage, trash, refuse, paper, rubbish, ashes, industrial wastes, demolition and construction wastes, abandoned vehicles and parts thereof, discarded home and industrial appliances, manure, vegetable or animal solid and semi-solid wastes and

other discarded waste (whether of solid or semi-solid consistency); provided that such wastes do not contain wastes which must be managed as hazardous wastes, or wastes which contain soluble pollutants in concentrations which exceed applicable water quality objectives, or could cause degradation of waters of the state (i.e., designated waste).

Any off-site disposal of RCRA hazardous waste must comply with LDR treatment standards (U.S. EPA, 2001a). Treatment to meet LDRs prior to land disposal could include incineration, stabilization, or other technologies. As the required treatment would be conducted at the off-Site, permitted disposal facility, any technology required to comply with LDRs is included in off-Site disposal.

Complete removal of soil containing COCs from the Site is likely to achieve applicable remediation goals for soil and can be readily implemented with standard construction equipment. Off-site disposal is retained for further consideration.

C.9 GROUNDWATER DIVERSION

Only certain AOCs at the Site have been shown to have impacted groundwater. The primary impacts to groundwater result from PCE vapor migration from soil at the Central Building P Area and Oil Staging Area and FHP on groundwater at the Building A Area. Groundwater collection and diversion technologies have been screened to assess their implementability at these AOCs. No groundwater impacts from metal-containing black sand and soil at the Building L Area have been identified.

C.9.1 Subsurface Barriers

Subsurface barriers, such as a slurry wall or sheet piling, are vertical structures installed into the subsurface to contain or redirect groundwater flow. Subsurface barriers are often used in conjunction with groundwater extraction to maintain hydraulic control. To be effective, a subsurface barrier must be completed or "keyed" into a continuous layer of clay deposits or competent bedrock. This layer must have sufficiently low permeability to prevent leakage underneath the barrier, it must have adequate thickness for an appropriate key (e.g., 2 to 3 feet), and it must be of moderate depth (50 to 70 ft bgs) or installation of the subsurface barrier may not be feasible (U.S. EPA, 1991c).

C.9.1.1 Slurry Wall

A slurry wall is constructed by excavating a narrow trench, typically 2 to 4 feet wide, and backfilling it with low-permeability material. As excavation proceeds, a bentonite-water mixture is temporarily placed in the trench to stabilize the trench walls, thereby preventing collapse. The bentonite-water mixture also permeates into the soil and creates a filter cake on the walls that seals the soil to prevent loss of the low-permeability slurry that will be used to permanently fill the trench. Use of a slurry wall is not retained for further consideration because a low permeability layer into which a slurry wall can be keyed does not exist beneath the Site at depths shallower than 90 ft bgs.

C.9.1.2 Sheet Piling

Sheet piling can consist of interlocking steel, precast concrete, or wood sections. In most applications to divert groundwater flow, steel is employed because concrete is used only in a situation where great lateral resistance is required and wood is a poor barrier against groundwater flow. Steel sheet piling is installed by driving individual sections into the ground with single, double-action impact or vibratory pile drivers. One of the biggest drawbacks of sheet piling is that it is difficult to install in rocky soil. Damage to or deflection of the steel sections is likely to render sheet piling ineffective as a groundwater barrier. Further, it is difficult to use sheet piling for deep groundwater situations because of limitations in the depth that piling can be driven. The maximum depth to which sheet piling can be driven without damage to the interlocks between individual sections is approximately 40 feet bgs (U.S. EPA, 1991c). The depth to groundwater at the Site is 50 ft bgs or deeper, which makes application of sheet piling for groundwater diversion unsuitable. Use of sheet piling is not retained for further consideration.

C.10 IN-SITU GROUNDWATER TREATMENT

In-situ groundwater treatment consists of remedial technologies that destroy COCs or reduce their toxicity or mobility without having to extract groundwater.

C.10.1 In-situ Groundwater Treatment Using Physical/Chemical Technology

Air sparging, permeable reactive walls, and oxidation/reduction are the process options considered in this RAP that use physical/chemical technology for in-situ treatment of groundwater.

C.10.1.1 In-situ Air Sparging

In-situ air sparging ("IAS")is a process for removing volatile contaminants from groundwater by causing them to partition from groundwater into an air stream. One or more injection wells in installed and screened below the zone of contamination in the groundwater. Air is then injected into these wells, causing volatilization of dissolved contaminants and desorption and eventual volatilization of contaminants that are sorbed onto soil in the saturated zone. If necessary, the resulting air stream containing VOCs can be collected through an SVE system for subsequent treatment. PCE has migrated as vapor from soil and dissolved into groundwater at the Central Building P Area and Oil Staging Area. SVE systems operating at these two AOCs are capable of treating the air stream resulting from IAS. IAS is retained for further consideration.

C.10.1.2 Permeable Reactive Walls

Permeable reactive walls consist of a permeable and reactive medium installed in a trench constructed across the groundwater flow path. A permeable reactive wall allows passage of groundwater while transforming COCs to harmless byproducts. The Ground-Water Remediation Technologies Analysis Center ("GWRTAC")[4] indicates in its technology evaluation report, entitled *Treatment Walls,* dated October 1996, that zero-valent iron is the most common reactive medium used in permeable reactive walls.

A primary design concern of a permeable reactive wall is ensuring that COC-containing groundwater passes through the structure (U.S. EPA, 1998a). The medium in the permeable reactive wall should be at least as permeable as the soil in the saturated zone. Also, the permeable reactive wall should be thick enough to allow for adequate residence times so COCs have sufficient contact times with the reactive surfaces.

Use of permeable reactive walls is an emerging physical/chemical process. Application of the process is limited. Further, the highly permeable soil beneath the Site make may it difficult to preferentially direct groundwater through the permeable reactive wall. Other suitable and more reliable processes exist for removing or treating COCs detected in

[4] GWRTAC is operated by Concurrent Technologies Corporation ("CTC"), in association with the University of Pittsburgh, through a cooperative agreement with U.S. EPA Technology Innovation office. According to CTC, GWRTAC reports are developed to provide a state-of-the-art review of a selected groundwater remediation technology or groundwater topic. GWRTAC reports contain information from peer-reviewed papers and publications, and in some instances, from personal communication with involved parties. GWRTAC reports are peer-reviewed before being released.

groundwater at the Site. Implementation of a permeable reactive wall is not retained for further consideration.

C.10.1.3 Chemical Oxidation/Reduction

In-situ chemical oxidation or reduction processes involve injecting a chemical oxidant or reducer directly into saturated soil. Common oxidants include hydrogen peroxide and potassium permanganate, and common reducing agents include sodium dithionite and hydrogen sulfide (GWRTAC, 1999; U.S. EPA, 1998b). The desired result of oxidation/reduction treatment is the complete transformation of COCs in groundwater to less toxic or non-toxic organic species, or water, carbon dioxide, and chloride ions.

The stratigraphy and geochemistry at a given site control the ability, amounts, and types of oxidants or reducers that must be delivered to the saturated zone. For example, if hydrogen peroxide is used to oxidize COCs in groundwater, the pH of saturated soil may have to be temporarily lowered and ferrous iron or other catalyst may have to be injected to facilitate the oxidation reaction. Delivery of the chemicals to the desired location and necessary mixing and distribution of these chemicals makes this process challenging. In-situ chemical oxidation/reduction is an emerging physical/chemical process. In-situ oxidation/reduction is not retained for further consideration because more cost effective and proven technologies are available for treatment of groundwater at the Site.

C.10.2 In-situ Groundwater Treatment Using Biological Technology

Bioremediation, as described for soil in Section C.5.3.2, can be performed by introducing oxygen and/or nutrients to groundwater. Under anaerobic conditions, in-situ bioremediation can effectively treat chlorinated organic solvents such as PCE. However, groundwater conditions at the Site are aerobic, making such treatment unsuitable. Bioremediation of petroleum hydrocarbons is possible under aerobic conditions, but petroleum hydrocarbons are found as immiscible oils on groundwater at the Building A Area and not as dissolved constituents that would make petroleum hydrocarbons amenable to in-situ bioremediation. In-situ bioremediation as a primary treatment method is not retained for further consideration.

C.11 GROUNDWATER EXTRACTION

Extraction provides hydraulic containment of chemical-containing groundwater by altering the direction of groundwater flow through creation of a depression in the piezometric surface. Extracted groundwater containing COCs must be treated or otherwise managed. Possible ex-situ treatment and management approaches are described in Sections C.12 and C.13, respectively.

Although extraction and ex-situ treatment is a presumptive remedy for sites with contaminated groundwater, restoration of chemical-containing groundwater generally will not be possible unless the source of COCs has been addressed. U.S. EPA (1996b) states that "source control is a critical component for active restoration remedies (e.g., extraction and treatment and in-situ methods) as well as for natural attenuation."

The characteristics of the chemicals released and the hydrogeologic properties of the site govern the potential for restoring groundwater to cleanup levels defined by ARARs or risk-based levels (U.S. EPA, 1996b). Relevant chemical characteristics include its volatility, how strongly it sorbs to soil, its potential for natural attenuation, quantities in which it was released, and whether it has formed non-aqueous phase liquid. Relevant hydrogeologic properties include the stratigraphy (e.g., degree of interbedded and discontinuous soil layers), types (e.g., sand or clay) and heterogeneity of soil present, saturated soil hydraulic conductivity, extent of vertical groundwater flow, and temporal variation in the rate of groundwater movement.

C.11.1 Wells

Although horizontal wells can be constructed for extraction of groundwater, vertical wells are almost exclusively used because of the relative ease and lower cost of construction. Vertical wells can be completed to essentially any depth and at any location that allows access for the drilling equipment. Vertical wells are strategically placed to contain and collect the groundwater with COCs. Once hydraulic control has been established, the extraction well can be effective in removing groundwater containing dissolved-phase COCs as well as free phase product. Extraction from wells already in place at the Building A Area have proven effective for collection of FHP. Groundwater extraction wells are retained for further consideration.

C.11.2 Trenches

Trenches or drains also may be used to collect groundwater. Drains are typically installed perpendicular to the direction of groundwater flow. Drains are constructed by excavating a trench and installing perforated pipe on aggregate base laid at the bottom of the trench.

The portion of the trench in saturated soil is then backfilled with aggregate or other envelope material. The remainder of the trench is backfilled with soil. A geotextile may also be installed in the trench to prevent fine soil particulates from clogging the drain. If the saturated soil has a moderate or high hydraulic conductivity, then a low-permeability geomembrane may be placed on the down gradient side of the trench to prevent groundwater from passing through the drain. Gravity drains could discharge to a sanitary sewer manhole, storm drain manhole or catch basin, or directly to a free-flowing stream or creek, if there is enough slope to the terrain. If the drain terminates below the entry point to the sewer, storm drain, or water body, a pump would be necessary to lift the water to the discharge point.

Trench systems are only used to install groundwater extraction systems if the water is very shallow and the soil has low permeability. One purpose of the trench is to create a highly permeable channel through the native soil to extract more groundwater than a well. Depths to groundwater of 50 feet or more and the highly permeable soil beneath the Price Pfister property make application of trench systems unsuitable. Use of trenches or drains is not retained for further consideration.

C.12 EX-SITU GROUNDWATER TREATMENT

Ex-situ groundwater treatment is necessary only if extraction is performed. Ex-situ groundwater treatment consists of physical/chemical and biological remedial technologies.

C.12.1 Ex-situ Groundwater Treatment Using Physical/Chemical Technology

Air stripping, adsorption, membrane separation, precipitation/coagulation, ion exchange, and advanced oxidation are the process options considered in this RAP that use physical/chemical technology for ex-situ treatment of groundwater.

C.12.1.1 Air Stripping

Air stripping is a physical process that transfers VOCs from water to air. VOC-containing groundwater is pumped to the top of a tower and distributed across trays or random packing. The water flows downward as a thin film across these surfaces. Air is blown into the base of the tower and travels upward. The trays or packing in the tower provide a large surface area and the flow of air creates a high level of turbulence. These two factors enhance mass transfer to the air. Subsequent treatment is often performed to recover or destroy VOCs in the air stream leaving the top of the tower.

Air stripping is a presumptive remedy for treatment of VOCs in groundwater (U.S. EPA, 1996b) and may have to be used in combination with adsorption to remove less volatile compounds such as petroleum hydrocarbons if present in extracted groundwater. Air stripping alone or in combination with adsorption is retained for further consideration.

C.12.1.2 Adsorption

Adsorption of COCs onto GAC, activated alumina, or other media is commonly used for treatment of chemical-containing groundwater and can be implemented with standard equipment. The media is placed as columns or beds in cylindrical vessels. GAC adsorption is a presumptive remedy for treatment of organic compounds in groundwater (U.S. EPA, 1996b). Physical adsorption of COCs onto GAC results from the action of van der Waals forces, which are relatively weak interactions produced by the motion of electrons in their orbitals. Adsorption onto GAC in the vapor phase can also be used to treat a vapor stream resulting from SVE or similar processes. Adsorption is retained for further consideration.

C.12.1.3 Membrane Separation

Membrane separation includes reverse osmosis, ultrafiltration, and electrodialysis. These processes involve forcing chemical-containing groundwater through a semi-permeable membrane to separate the COCs in a concentrate stream and clean water in a permeate stream. It may be possible to reduce concentrations of VOCs and some metals in water. The presence of oil or grease, however, interferes with the separation process. Reverse osmosis is a presumptive remedy for treatment of metals in groundwater (U.S. EPA, 1996b), but metals have not substantially impacted groundwater at the Site. Therefore, membrane separation is not retained for further consideration.

C.12.1.4 Precipitation/Coagulation

Precipitation involves mixing chemical reagents in water to convert soluble COCs to insoluble forms. Coagulation involves mixing chemical reagents in water to cause soluble COCs to aggregate into flocs. Precipitates and flocs are subsequently removed from water by settling and/or filtration. Precipitation/coagulation is a presumptive remedy for treatment of metals in groundwater (U.S. EPA, 1996b), but metals have not impacted groundwater at the Site, making precipitation or coagulation unnecessary for treatment of groundwater at the Price Pfister property. This process option is not retained for further consideration.

C.12.1.5 Ion Exchange

Ion exchange captures ionic COCs in groundwater on a resin. The resin is placed as columns or beds in cylindrical vessels. According to Freeman (1989), ion exchange resins can be described "simply as solid, insoluble acids or bases that are capable of entering into chemical reactions in the same way as their mineral or organic acid analogs." Ion exchange is a presumptive remedy for treatment of metals in groundwater (U.S. EPA, 1996b), but metals have not impacted groundwater at the Site. This process option is not retained for further consideration.

C.12.1.6 Advanced Oxidation

Advanced oxidation entails using strong oxidants to destroy COCs in groundwater. Common oxidants include hydrogen peroxide, ozone, and ultraviolet light. These oxidants can be used alone or in combination to destroy COCs. Advanced oxidation is a presumptive remedy for treatment of organic compounds in groundwater (U.S. EPA, 1996b). Advanced oxidation is retained for further consideration.

C.12.2 Ex-situ Groundwater Treatment Using Biological Technology

Bioremediation described in Section C.5.3.2 can be performed ex-situ as well as in-situ. However, microbial degradation of chlorinated organic solvents in the groundwater would require a complicated treatment process to induce conditions necessary for effective treatment of PCE found in groundwater at the Site. Other more straightforward and reliable processes are available for treatment of VOC-impacted groundwater. Bioremediation is not retained for further consideration.

C.13 EXTRACTED GROUNDWATER MANAGEMENT

In the event that groundwater is extracted or collected at the Site, the resulting water produced must be managed. Potential means of management evaluated in this RAP consist of reclamation, discharge to the sanitary sewer, discharge to the storm drain, and disposal at an off-Site permitted facility.

C.13.1 Groundwater Reclamation

No opportunities for reclamation of treated groundwater have been identified at the Site. No irrigation systems, ponds, or water features that could potentially accept treated water are anticipated at the Site. Reclamation is not retained for further consideration.

C.13.2 Groundwater Discharge to Sanitary Sewer

The City of Los Angeles operates the publicly owned treatment works that processes sanitary sewer effluent from the Site. Although COCs in groundwater at the Site are greater than State of California maximum contaminant levels or U.S. EPA preliminary remediation goals, concentrations of these chemicals are generally less than the numerical limitations on wastewater discharge to the sanitary sewer established by the City of Los Angeles. However, discharge to the sanitary sewer is prohibited if the option to discharge to a storm drain exists. For this reason, discharge of treated groundwater to the sanitary sewer is not retained for further consideration.

C.13.3 Groundwater Discharge to Storm Drain

Discharge of treated groundwater to the storm drain is possible, but is likely to require a National Pollutant Discharge Elimination System permit. Approval to discharge to a storm drain may necessitate demonstrating that other means of managing treated groundwater are technically or economically infeasible. Discharge to the storm drain is retained for further consideration.

C.13.4 Groundwater Disposal at an Off-Site Permitted Facility

Off-Site disposal of groundwater entails transporting extracted water to a permitted facility. Such disposal is likely to be cost-effective only when the quantities of groundwater extracted are small, or the recovered water is highly contaminated or contains immiscible liquids. FHP collected from wells at the Building A Area is disposed at an off-Site, permitted facility that recycles used oil and other petroleum waste. Disposal of extracted groundwater at an off-Site, permitted facility is retained for further consideration.

C-1 ASSEMBLED OF REMEDIAL ALTERNATIVES

General response actions, remedial technologies, and process options for soil and groundwater that passed the evaluation performed in this section have been combined to create potential remedial alternatives as summarized in Table C-1. Detailed analysis of these remedial alternatives and discussion of recommendation of remedial actions are provided in Sections 10 and 11, respectively.

Table C-1
Summary of Remedial Alternatives Retained for Detailed Analysis
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Area of Concern	Potentially Applicable Remedial Alternative	Soil Process Option	Groundwater Process Option
Central Building P Area			
	Alternative 1 No Action for Soil and Groundwater	No Action	No Action
	Alternative 2 Perform Soil Vapor Extraction ("SVE") in Soil and Monitor Natural Attenuation of Groundwater	Institutional Controls Soil Vapor Extraction Monitor Soil Vapor	Institutional Controls Monitor Groundwater
	Alternative 3 Perform Soil Vapor Extraction in Soil and Conduct In-Situ Air Sparging ("IAS") in Groundwater	Institutional Controls Soil Vapor Extraction Monitor Soil Vapor	Institutional Controls Air Sparging Monitor Groundwater

Table C-1
Summary of Remedial Alternatives Retained for Detailed Analysis
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Area of Concern	Potentially Applicable Remedial Alternative	Soil Process Option	Groundwater Process Option
Central Building P Area	Alternative 4 Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater	Institutional Controls Soil Excavation Dispose of Soil Off-site	Institutional Controls Groundwater Extraction Ex-situ Groundwater Treatment Discharge to Storm Drain Monitor Groundwater
	Alternative 5 Excavate Subsurface Structures and Dispose of Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater	Institutional Controls Soil Excavation Dispose of Soil Off-site Soil Vapor Extraction Monitor Soil Vapor	Institutional Controls Air Sparging Monitor Groundwater

Table C-1
Summary of Remedial Alternatives Retained for Detailed Analysis
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Area of Concern	Potentially Applicable Remedial Alternative	Soil Process Option	Groundwater Process Option
Central Building P Area	Alternative 6 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater	Institutional Controls Soil Excavation Dispose of Soil Off-site Soil Vapor Extraction Monitor Soil Vapor	Institutional Controls Groundwater Extraction Ex-situ Groundwater Treatment Discharge to Storm Drain Monitor Groundwater
Building A Area	Alternative 1 No Action for Soil and Groundwater	No Action	No Action

Table C-1

Summary of Remedial Alternatives Retained for Detailed Analysis

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Area of Concern	Potentially Applicable Remedial Alternative	Soil Process Option	Groundwater Process Option
Building A Area	Alternative 2 Perform Complete Excavation and Dispose of Soil Off-Site, and Collect Free Hydrocarbon Product ("FHP") From Groundwater	Institutional Controls	Institutional Controls
		Complete Soil Excavation	FHP Collection
		Dispose of Soil Off-site	Dispose of FHP Off-Site
			Monitor Groundwater
	Alternative 3 Perform Limited Excavation and Dispose of Soil Off-Site, and Collect FHP From Groundwater	Institutional Controls	Institutional Controls
		Limited Soil Excavation	FHP Collection
		Dispose of Soil Off-site	Dispose of FHP Off-Site
			Monitor Groundwater

Table C-1
Summary of Remedial Alternatives Retained for Detailed Analysis
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Area of Concern	Potentially Applicable Remedial Alternative	Soil Process Option	Groundwater Process Option
Oil Staging Area	Alternative 1 No Action for Soil and Groundwater	No Action	No Action
	Alternative 2 Perform Soil Vapor Extraction ("SVE") in Soil and Monitor Natural Attenuation of Groundwater	Institutional Controls	Institutional Controls
		Soil Vapor Extraction	Monitor Groundwater
		Monitor Soil Vapor	
	Alternative 3 Perform SVE in Soil and Conduct In-Situ Air Sparging ("IAS") in Groundwater	Institutional Controls	Institutional Controls
		Soil Vapor Extraction	Air Sparging
		Monitor Soil Vapor	Monitor Groundwater

Table C-1
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Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Area of Concern	Potentially Applicable Remedial Alternative	Soil Process Option	Groundwater Process Option
Oil Staging Area	Alternative 4 Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater	Institutional Controls Soil Excavation Dispose of Soil Off-site	Institutional Controls Groundwater Extraction Ex-situ Groundwater Treatment Discharge to Storm Drain Monitor Groundwater
	Alternative 5 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater	Institutional Controls Soil Excavation Dispose of Soil Off-site Soil Vapor Extraction Monitor Soil Vapor	Institutional Controls Air Sparging Monitor Groundwater

Table C-1
Summary of Remedial Alternatives Retained for Detailed Analysis
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Area of Concern	Potentially Applicable Remedial Alternative	Soil Process Option	Groundwater Process Option
Oil Staging Area	Alternative 6 Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater	Institutional Controls	Institutional Controls
		Soil Excavation	Groundwater Extraction
		Dispose of Soil Off-site	Ex-situ Groundwater Treatment
		Soil Vapor Extraction	Discharge to Storm Drain
		Monitor Soil Vapor	Monitor Groundwater

Table C-1
Summary of Remedial Alternatives Retained for Detailed Analysis
Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Area of Concern	Potentially Applicable Remedial Alternative	Soil Process Option	Groundwater Process Option
Building L Area			
	Alternative 1 No Action for Soil and Groundwater	No Action	No Action
	Alternative 2 Excavate and Dispose of Soil Off-Site, and No Action for Groundwater	Institutional Controls Soil Excavation Dispose of Soil Off-site	No Action

APPENDIX D

COSTS OF REMEDIAL ALTERNATIVES

LIST OF TABLES

LIST OF TABLES

LIST OF TABLES

Table D-1

Summary of Key Parameters for Remedial Alternatives

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Location	Key Parameters
Central Building P Area	**Common to Remedial Alternatives 2, 3, 4, 5, and 6** • Primary COCs: PCE, TEPH **Specific to Alternative 2** • Extract soil vapor from 4 SVE wells for 6 months • Monitor groundwater quarterly for 6 months • Monitor soil vapor quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Install 4 groundwater monitoring wells after redevelopment • Monitor groundwater quarterly for 5 years **Specific to Alternative 3** • Install 6 IAS wells • Inject air into groundwater from IAS wells for 6 months • Extract soil vapor from 4 SVE wells for 6 months • Monitor groundwater quarterly for 6 months • Monitor soil vapor quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Decomission IAS system **Specific to Alternative 4** • Excavate 750 cy of PCE-impacted soil around boring location PSVE-2 and the former Baron degreaser and dispose of this soil as non-RCRA hazardous waste • Excavate 275 cy of PCE- and TEPH-impacted soil beneath and around a former clarifier and dispose of this soil as non-hazardous waste • Excavate 50 cy of PCE-impacted soil at boring W18 and dispose of this soil as non-hazardous waste • Install 2 groundwater extraction wells in Central Building P Area • Extract groundwater from two groundwater extraction wells at 20 gpm each for 6 months • Extracted groundwater has PCE concentration of 830 ug/L, 1,1,1-TCA at 11 ug/L, TCE at 23 ug/L, cis-1,2-DCE at 12 ug/L, 1,1-DCE at 21 ug/L, and TEPH at 48 ug/L (1) • Monitor groundwater quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Decomission groundwater extraction and treatment system

Table D-1

Summary of Key Parameters for Remedial Alternatives

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Location	Key Parameters
Central Building P Area	**Specific to Alternative 5** • Excavate 100 cy of PCE- and TEPH-impacted soil beneath and around a former clarifier and dispose of this soil as non-hazardous waste • Install 6 IAS wells in Central Building P Area • Inject air into groundwater from IAS wells for 6 months • Extract soil vapor from 4 SVE wells for 6 months • Monitor groundwater quarterly for 6 months • Monitor soil vapor quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Decomission IAS system **Specific to Alternative 6** • Excavate 100 cy of PCE- and TEPH-impacted soil beneath and around a former clarifier and dispose of this soil as non-hazardous waste • Install 2 groundwater extraction wells in Central Building P Area • Extract groundwater from two groundwater extraction wells at 20 gpm each for 6 months • Extracted groundwater has PCE concentration of 830 ug/L, 1,1,1-TCA at 11 ug/L, TCE at 23 ug/L, cis-1,2-DCE at 12 ug/L, 1,1-DCE at 21 ug/L, and TEPH at 48 ug/L (1) • Extract soil vapor from 4 SVE wells for 6 months • Monitor groundwater quarterly for 6 months • Monitor soil vapor quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Decomission groundwater extraction and treatment system
Building A Area	**Common to Alternatives 2 and 3** • Primary COCs: TEPH • Automate FHP collection system to include 6 wells total • Collect 20 gallons of FHP per month from each collection well for 6 months • Decomission existing FHP collection system • Install 13 FHP collection wells in Building A Area after redevelopment • Collect 20 gallons of FHP per month from each collection well for 6 months **Specific to Alternative 2** • Excavate 25,000 cy of TEPH-impacted soil and dispose of this soil as non-hazardous waste **Specific to Alternative 3** • Excavate 1,200 cy of TEPH-impacted soil and dispose of this soil as non-hazardous waste

Table D-1

Summary of Key Parameters for Remedial Alternatives

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Location	Key Parameters
Oil Staging Area	**Common to Remedial Alternatives 2, 3, 4, 5, and 6** • Primary COCs: PCE, TEPH **Specific to Alternative 2** • Extract soil vapor from 3 SVE wells for 6 months • Monitor groundwater quarterly for 6 months • Monitor soil vapor quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Install 3 groundwater monitoring wells after redevelopment • Monitor groundwater quarterly for 5 years **Specific to Alternative 3** • Install 6 IAS wells • Inject air into groundwater from IAS wells for 6 months • Extract soil vapor from 3 SVE wells for 6 months • Monitor groundwater quarterly for 6 months • Monitor soil vapor quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Decomission IAS system **Specific to Alternative 4** • Excavate 600 cy of PCE-impacted soil beneath and around former containment sump and dispose of 25% of this soil as non-RCRA hazardous waste and 75% of this soil non-hazardous waste • Install 1 groundwater extraction well in Oil Staging Area • Extract groundwater from one groundwater extraction well at 20 gpm for 6 months • Extracted groundwater has PCE concentration of 204 ug/L, 1,1,1-TCA at 3.1 ug/L, TCE at 7.0 ug/L, cis-1,2-DCE at 2.5 ug/L, 1,1-DCE at 5.8 ug/L, and TEPH at 25 ug/L (2) • Monitor groundwater quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Decomission groundwater extraction and treatment system **Specific to Alternative 5** • Excavate 100 cy of PCE-impacted soil beneath and around former containment sump and dispose of this soil as non-hazardous waste • Install 6 IAS wells in Oil Staging Area • Inject air into groundwater from IAS wells for 6 months • Extract soil vapor from 3 SVE wells for 6 months • Monitor groundwater quarterly for 6 months • Monitor soil vapor quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Decomission IAS system

Table D-1

Summary of Key Parameters for Remedial Alternatives

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Location	Key Parameters
Oil Staging Area	**Specific to Alternative 6** • Excavate 100 cy of PCE-impacted soil beneath and around former containment sump and dispose of this soil as non-hazardous waste • Install 1 groundwater extraction well in Oil Staging Area • Extract groundwater from one groundwater extraction well at 20 gpm for 5 years • Extracted groundwater has PCE concentration of 204 ug/L, 1,1,1-TCA at 3.1 ug/L, TCE at 7.0 ug/L, cis-1,2-DCE at 2.5 ug/L, 1,1-DCE at 5.8 ug/L, and TEPH at 25 ug/L (2) • Extract soil vapor from 3 wells in Oil Staging Area for 6 months • Monitor groundwater quarterly for 6 months • Monitor soil vapor quarterly for 6 months • Abandon soil vapor/groundwater and groundwater monitoring wells prior to redevelopment • Decomission existing SVE system • Decomission groundwater extraction and treatment system
Building L Area	**Specific to Alternative 2** • Primary COCs: Metals, particularly copper and lead, and PCE • Excavate 1,500 cy of black sand and impacted soil and dispose of 50% of excavated black sand and soil as RCRA hazardous waste and 50% as non-RCRA hazardous waste

Table D-1

Summary of Key Parameters for Remedial Alternatives

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Abbreviations

COC	chemical of concern
cy	cubic yards
1,1-DCE	1,1-dichloroethene
cis-1,2-DCE	cis-1,2-dichloroethene
FHP	free hydrocarbon product
gal	gallons
gpm	gallons per minute
IAS	in-situ air sparging
PCE	tetrachloroethene
RCRA	Resource Conservation and Recovery Act
SVE	soil vapor extraction
1,1,1-TCA	1,1,1-trichloroethane
TEPH	total extractable petroleum hydrocarbons
ug/L	micrograms per liter
VOC	volatile organic compound

Notes

(1) VOC concentrations in groundwater extracted from Central Building P Area are assumed to be equal to an average of concentrations detected in samples collected from wells PMW-23 and PMW-26 in January 2003.

(2) VOC concentrations in groundwater extracted from Oil Staging Area are assumed to be equal equal to an average of concentrations detected in samples collected from wells PMW-11 and PMW-22 in January 2003.

Table D-2

Estimated Capital Costs for Alternative 2 - Central Building P Area
Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Decommission Existing SVE System					
• Abandon 4 SVE wells at Central Building P Area (2)	ea	4	$1,500	$6,000	
• Remove blower, treatment equipment, and appurtenances	ls	1	$5,000	$5,000	
• Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
				$8,300	$8,300
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	2	$260	$520	
				$4,720	$4,720
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$472
Monitor Natural Attenuation in Groundwater					
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 4 soil vapor/groundwater monitoring wells (2)	ea	4	$2,000	$8,000	
				$8,000	$8,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Construct Four Groundwater Monitoring Wells					
• Permit well installation	ls	1	$1,000	$1,000	
• Install 4-inch diameter groundwater monitoring well s to 80 ft bgs	ea	4	$3,000	$12,000	
• Develop groundwater monitoring wells	ea	4	$350	$1,400	
• Provide cap and vault for each well	ea	4	$400	$1,600	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Transport and dispose of drill cuttings as non-hazardous waste (3)	ton	28	$44	$1,229	
• Transport and dispose of development water	drum	12	$150	$1,800	
				$20,029	$20,029

Table D-2

Estimated Capital Costs for Alternative 2 - Central Building P Area Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	6	$1,000	$6,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	6	$260	$1,560	
				$12,360	$12,360
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,236
Abandon Groundwater Monitoring Wells					
• Abandon 4 groundwater monitoring wells (2)	ea	4	$2,000	$8,000	
				$8,000	$8,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction Observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$79,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$16,000*
Total Estimated Costs:					***$95,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a subsurface obstruction.

(3) Density of soil is assumed to be 1.5 tons per cubic yard.

Table D-3

Estimated Annual Costs for Alternative 2 - Central Building P Area Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater Prior to Redevelopment

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Operate and Monitor SVE System					
• Lease one 250 scfm blower	mo	12	$1,600	$19,200	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide electrical power for blower (2)	hp	10	$657	$6,570	
• Operate and maintain equipment	mo	12	$1,600	$19,200	
• Replace spent GAC (3)	lb	4,500	$1.68	$7,560	
• Transport and dispose of spent GAC by incineration	lb	4,500	$1.65	$7,425	
• Sample extraction wells and GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	96	$300	$28,800	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$110,955	$110,955
Monitor Soil Vapor Monitoring Wells					
• Sample, and conduct mobile laboratory analysis of samples from 4 vapor monitoring wells on quarterly basis	ea	4	$7,500	$30,000	
• Prepare quarterly report compiling soil vapor monitoriing data	ea	4	$1,500	$6,000	
				$36,000	$36,000
Monitor Natural Attenuation in Groundwater					
Sample Groundwater Monitoring Wells					
• Sample 4 groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	20	$158	$3,163	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	20	$76	$1,518	
Selected metals (EPA Method 6010)	ea	20	$190	$3,795	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$1,500	$6,000	
				$22,476	$22,476
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$169,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$34,000*
Total Estimated Costs:					***$200,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 10 hp blower.
(3) Assumes GAC usage rate of 375 lbs/month, based on current operation of SVE systems.

Table D-4

Estimated Annual Costs for Alternative 2 - Central Building P Area Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater After Redevelopment

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Monitor Natural Attenuation in Groundwater					
Sample Groundwater Monitoring Wells					
• Sample 4 groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	20	$158	$3,163	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	20	$76	$1,518	
Selected metals (EPA Method 6010)	ea	20	$190	$3,795	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$2,000	$8,000	
				$24,476	$24,476
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$24,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$5,000*
Total Estimated Costs:					***$30,000***

Notes
(1) Totals may not sum exactly due to rounding.

Table D-5
Estimated Capital Costs for Alternative 3 - Central Building P Area
Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Decommission Existing SVE System					
• Abandon 4 SVE wells at Central Building P Area (2)	ea	4	$1,500	$6,000	
• Remove blower, treatment equipment, and appurtenances	ls	1	$5,000	$5,000	
• Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
				$8,300	$8,300
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	2	$260	$520	
				$4,720	$4,720
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$472
Conduct IAS in Groundwater					
Construct Six Air Sparging Wells at Central Building P Area					
• Permit well installation	ls	1	$2,000	$2,000	
• Install 2-in dia IAS wells to 90 ft bgs	ea	6	$6,000	$36,000	
• Develop IAS wells	ea	6	$500	$3,000	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Dispose of drill cuttings as a non-hazardous waste (3)	ton	16	$44	$720	
• Dispose of development water as non-hazardous waste	drum	15	$150	$2,182	
				$44,902	$44,902
Install Air Compressor System and Controls					
• Install system and controls at Building P Area	ls	1	$3,750	$3,750	
• Install above-grade conveyance piping	lf	200	$3	$600	
				$4,350	$4,350
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare plans and specifications	ls	1	$5,000	$5,000	
Conduct surveying of well locations	ls	1	$1,500	$1,500	
Bid, award, and negotiate installation contracts	ls	1	$2,500	$2,500	
• Construction observation					
Provide resident engineer	day	10	$1,000	$10,000	
Provide office support	day	5	$400	$2,000	
Provide vehicles and equipment	day	10	$260	$2,600	
Prepare completion report	ls	1	$10,000	$10,000	
				$43,600	$43,600
Engineering Project Management					
• 10 percent of Design and Construction Management Services		10%	--	--	$4,360

Table D-5

Estimated Capital Costs for Alternative 3 - Central Building P Area Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Decommission Existing IAS System					
• Abandon 6 IAS wells at Central Building P Area (2)	ea	6	$2,000	$12,000	
• Remove air compressor, hoses, and appurtenances	ls	1	$1,000	$1,000	
				$13,000	$13,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	1	$1,000	$1,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	1	$260	$260	
				$3,460	$3,460
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$346
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 4 soil vapor/groundwater monitoring wells (2)	ea	4	$2,000	$8,000	
				$8,000	$8,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$141,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$28,000*
Total Estimated Costs:					***$169,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a subsurface obstruction.

(3) Density of soil is assumed to be 1.5 tons per cubic yard.

Table D-6

Estimated Annual Costs for Alternative 3 - Central Building P Area
Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Operate and Monitor SVE System					
• Lease one 250 scfm blower	mo	12	$1,600	$19,200	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide electrical power for blower (2)	hp	10	$657	$6,570	
• Operate and maintain equipment	mo	12	$1,600	$19,200	
• Replace spent GAC (3)	lb	4,500	$1.68	$7,560	
• Transport and dispose of spent GAC by incineration	lb	4,500	$1.65	$7,425	
• Sample extraction wells and GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	96	$300	$28,800	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$110,955	$110,955
Monitor Soil Vapor					
• Sample, and conduct mobile laboratory analysis of samples from 4 vapor monitoring wells on quarterly basis	ea	4	$7,500	$30,000	
• Prepare quarterly report compiliing soil vapor data	ea	4	$1,500	$6,000	
				$36,000	$36,000
Conduct IAS in Groundwater					
Operate and Monitor IAS Systems					
• Lease one air compressor system	mo	12	$400	$4,800	
• Operate and monitor equipment	mo	12	$100	$1,200	
• Provide electrical power for air compressors (4)	hp	5	$657	$3,285	
• Replace additional spent GAC	lb	1,000	$1.68	$1,680	
• Transport and dispose of spent GAC by incineration	lb	1,000	$1.65	$1,650	
Monitor Groundwater					
• Sample 4 groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	20	$158	$3,163	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	20	$76	$1,518	
Selected metals (EPA Method 6010)	ea	20	$190	$3,795	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$1,500	$6,000	
				$35,091	$35,091
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$182,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$36,000*
Total Estimated Costs:					***$220,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 10 hp blower.
(3) Assumes GAC usage rate of 375 lbs/month, based on current operation of SVE systems.
(4) Assumes one 5 hp compressor.

Table D-7

Estimated Capital Costs for Alternative 4 - Central Building P Area
Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Excavate Soil and Dispose Off-Site					
General Site Preparation					
• Mobilize contractor equipment and supplies to Site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Remove and Dispose of Clarifier and Excavate Impacted Soil					
• Remove/demolish and dispose of subsurface structure (2) (3)	ls	1	$5,000	$5,000	
• Excavate impacted soil and stockpile for characterization (4)	yd^3	100	$8	$800	
• Excavate surrounding clean soil at a 2:1 slope and stockpile for characterization and replacement	yd^3	363	$8	$2,902	
• Collect one confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	5	$200	$1,000	
• Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	5	$158	$791	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	5	$76	$380	
• Collect one 4 point composite soil sample for disposal profile per 50 yd^3 of stockpiled impacted soil	ea	2	$26	$52	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
Selected metals (EPA Method 6010)	ea	2	$190	$380	
WET extraction	ea	2	$63	$127	
TCLP extraction	ea	2	$63	$127	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	12	$32	$380	
• Collect one 4 point composite soil sample per 200 yd^3 of stockpiled clean soil	ea	2	$26	$52	
• Analyze clean soil characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
• Load characterized impacted soil into trucks (5)	ton	150	$5	$750	
• Transport and dispose of soil as non-hazardous waste	ton	150	$44	$6,600	
• Import, place, and compact clean fill	yd^3	100	$25	$2,500	
• Replace stockpiled clean soil	yd^3	363	$10	$3,628	
				$26,402	$26,402

Table D-7

Estimated Capital Costs for Alternative 4 - Central Building P Area Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Remove and Dispose of PCE-Impacted Soil Near PSVE-2					
● Remove and dispose of concrete/asphalt (2)	--	--	--	--	
● Drive, extract, and salvage sheeting and shoring to 10 ft deep	ft^2	2,700	$25	$67,500	
● Excavate impacted soil and stockpile for characterization (6)	yd^3	750	$8	$6,000	
● Collect one confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	6	$200	$1,200	
● Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	6	$158	$949	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	6	$76	$455	
Selected metals (EPA Method 6010)	ea	6	$190	$1,139	
● Collect one 4 point composite soil sample for disposal profile per 200 yd^3 of stockpiled soil	ea	4	$26	$104	
● Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	4	$158	$633	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	4	$76	$304	
Selected metals (EPA Method 6010)	ea	4	$190	$759	
WET extraction	ea	4	$63	$253	
TCLP extraction	ea	4	$63	$253	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	24	$32	$759	
● Load characterized soil into trucks (5)	ton	1,125	$5	$5,625	
● Transport and dispose of soil as non-RCRA hazardous waste	ton	1,125	$70	$78,750	
● Import, place, and compact clean fill	yd^3	750	$25	$18,750	
				$183,432	$183,432

Table D-7

Estimated Capital Costs for Alternative 4 - Central Building P Area Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Remove and Dispose of PCE-Impacted Soil Around W18					
• Remove and dispose of concrete/asphalt (2)	--	--	--	--	
• Drive, extract, and salvage sheeting and shoring to 10 ft deep	ft^2	2,700	$25	$67,500	
• Excavate impacted soil and stockpile for characterization (7)	yd^3	50	$8	$400	
• Excavate surrounding clean soil at a 2:1 slope and stockpile for characterization and replacement	yd^3	178	$8	$1,422	
• Collect one confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	5	$200	$1,000	
• Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	5	$158	$791	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	5	$76	$380	
Selected metals (EPA Method 6010)	ea	5	$190	$949	
• Collect one 4 point composite soil sample for disposal profile per 200 yd^3 of stockpiled soil	ea	1	$26	$26	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	1	$158	$158	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	1	$76	$76	
Selected metals (EPA Method 6010)	ea	1	$190	$190	
WET extraction	ea	1	$63	$63	
TCLP extraction	ea	1	$63	$63	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	6	$32	$190	
• Collect one 4 point composite soil sample per 200 yd^3 of stockpiled clean soil	ea	1	$26	$26	
• Analyze clean soil characterization samples					
VOCs (EPA Method 8260)	ea	1	$158	$158	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	1	$76	$76	
• Load characterized impacted soil into trucks (5)	ton	75	$5	$375	
• Transport and dispose of soil as non-hazardous waste	ton	75	$44	$3,300	
• Import, place, and compact clean fill	yd^3	50	$25	$1,250	
• Replace stockpiled clean soil	yd^3	178	$10	$1,778	
				$80,170	$80,170
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare plans and specifications	ls	1	$5,000	$5,000	
• Construction observation					
Provide resident engineer	day	15	$1,000	$15,000	
Provide office support	day	5	$400	$2,000	
Provide vehicles and equipment	day	15	$260	$3,900	
Conduct geotechnical and compaction testing	day	1	$650	$650	
Perform air monitoring	day	15	$200	$3,000	
Prepare completion report	ls	1	$10,000	$10,000	
				$49,550	$49,550
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$4,955

Table D-7

Estimated Capital Costs for Alternative 4 - Central Building P Area Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Extract and Treat Groundwater					
Construct Two Groundwater Extraction Wells at Central Building P Area					
• Permit well installation	ls	1	$1,000	$1,000	
• Install 4-in dia groundwater extraction wells to 80 ft bgs	ea	2	$6,000	$12,000	
• Develop groundwater extraction wells	ea	2	$500	$1,000	
• Pumps, gauges, controls, vaults, etc. for wellhead completion	ea	2	$5,000	$10,000	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Dispose of drill cuttings as a non-hazardous waste (5)	ton	5	$44	$213	
• Dispose of development water as non-hazardous waste	drum	6	$150	$900	
				$26,113	$26,100
Install Conveyance and Treatment System					
• Install above-grade conveyance piping	lf	150	$5	$750	
• Purchase and install air stripper with 40 gpm capacity	ls	1	$22,000	$22,000	
• Install a leased soil vapor treament systems, each consisting of two 1,000 pound GAC contactors in series	ea	1	$5,000	$5,000	
				$27,750	$27,750
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare remedial design and implementation plan	ls	1	$10,000	$10,000	
Bid, award, and negotiate installation contracts	ls	1	$5,000	$5,000	
Obtain permit to discharge treated groundwater	ls	1	$5,000	$5,000	
• Construction Observation					
Provide resident engineer	day	5	$1,000	$5,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	5	$260	$1,300	
				$37,100	$37,100
Engineering Project Management					
• 10 percent of Design and Construction Management Services		10%	--	--	$3,710
Decommission Groundwater Extraction and Treatment System					
• Abandon 2 groundwater extraction wells at Central Building P Area (8)	ea	2	$2,000	$4,000	
• Remove air stripper, hoses, and appurtenances	ls	1	$2,000	$2,000	
				$6,000	$6,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	1	$1,000	$1,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	1	$260	$260	
				$3,460	$3,460
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$346

Table D-7

Estimated Capital Costs for Alternative 4 - Central Building P Area Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 4 soil vapor/groundwater monitoring wells (8)	ea	4	$2,000	$8,000	
				$8,000	$8,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$467,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$93,000*
Total Estimated Costs:					***$560,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Removal and disposal of concrete floor slab are assumed to be costs that will be incurred as part of building demolition and are not included herein.
(3) Approximate dimensions of clarifier are 10 feet long by 2.2 feet wide by 7.33 feet deep.
(4) Excavation is assumed to consist of petroleum hydrocarbon-containing soil to a depth of 5 feet below the base of the clarifier and 5 feet of soil around the circumference of the clarifier to a depth of 5 feet below the bottom of the clarifier.
(5) Density of soil is assumed to be 1.5 tons per cubic yard.
(6) Excavation is assumed to consist of PCE-containing soil to a depth of 5 feet in an area that is 90 feet long by 50 feet wide.
(7) Excavation is assumed to consist of PCE-containing soil to a depth of 10 feet in an area that is 10 feet long by 10 feet wide.
(8) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a a subsurface obstruction.

Table D-8

Estimated Annual Costs for Alternative 4 - Central Building P Area
Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

	Estimated Costs				
Task Description	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Extract and Treat Groundwater					
Operate and Monitor Extraction and Treatment System					
• Provide power to operate pumps (2)	hp	4	$657	$2,628	
• Operate and monitor equipment	mo	12	$1,000	$12,000	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Replace spent GAC	lb	3,000	$1.68	$5,040	
• Transport and dispose of spent GAC by incineration	lb	3,000	$1.65	$4,950	
• Collect quarterly sample of effluent from each extraction well	ea	4	$500	$2,000	
• Analyze quarterly efflent samples by EPA Method 8260 wells by EPA Method 8260	ea	12	$158	$1,896	
• Sample GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	36	$300	$10,800	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$61,514	$61,514
Monitor Groundwater					
• Sample groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	20	$158	$3,163	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	20	$76	$1,518	
Selected metals (EPA Method 6010)	ea	20	$190	$3,795	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$2,000	$8,000	
				$24,476	$24,476
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$86,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$17,000*
Total Estimated Costs:					***$100,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Assumes two 2 hp pumps.

Table D-9

Estimated Capital Costs for Alternative 5 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Excavate Subsurface Structures and Dispose Off-Site					
General Site Preparation					
• Mobilize contractor equipment and supplies to Site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Remove and Dispose of Clarifier and Excavate Impacted Soil					
• Remove/demolish and dispose of subsurface structure (2) (3)	ls	1	$5,000	$5,000	
• Excavate impacted soil and stockpile for characterization (4)	yd^3	100	$8	$800	
• Excavate surrounding clean soil at a 2:1 slope and stockpile for characterization and replacement	yd^3	363	$8	$2,902	
• Collect one confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	5	$200	$1,000	
• Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	5	$158	$791	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	5	$76	$380	
• Collect one 4 point composite soil sample for disposal profile per 50 yd^3 of stockpiled impacted soil	ea	2	$26	$52	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
Selected metals (EPA Method 6010)	ea	2	$190	$380	
WET extraction	ea	2	$63	$127	
TCLP extraction	ea	2	$63	$127	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	12	$32	$380	
• Collect one 4 point composite soil sample per 200 yd^3 of stockpiled clean soil	ea	2	$26	$52	
• Analyze clean soil characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
• Load characterized impacted soil into trucks (5)	ton	150	$5	$750	
• Transport and dispose of soil as non-hazardous waste	ton	150	$44	$6,600	
• Import, place, and compact clean fill	yd^3	100	$25	$2,500	
• Replace stockpiled clean soil	yd^3	363	$10	$3,628	
				$26,402	$26,402

Table D-9

Estimated Capital Costs for Alternative 5 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
● Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
● Construction observation					
Provide resident engineer	day	3	$1,000	$3,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	3	$260	$780	
Conduct geotechnical and compaction testing	day	0.5	$650	$325	
Perform air monitoring	day	3	$200	$600	
Prepare completion report	ls	1	$10,000	$10,000	
				$19,105	$19,105
Engineering Project Management					
● 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,911
Perform SVE in Soil					
Decommission Existing SVE System					
● Abandon 4 SVE wells at Central Building P Area (6)	ea	4	$1,500	$6,000	
● Remove blower, treatment equipment, and appurtenances	ls	1	$5,000	$5,000	
● Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
				$8,300	$8,300
Design and Construction Management Services					
● Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
● Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	2	$260	$520	
				$4,720	$4,720
Engineering Project Management					
● 10 percent of Design and Construction Management Services	ls	10%	--	--	$472
Conduct IAS in Groundwater					
Construct Six Air Sparging Wells at Central Building P Area					
● Permit well installation	ls	1	$2,000	$2,000	
● Install 2-in dia IAS wells to 90 ft bgs	ea	6	$6,000	$36,000	
● Develop IAS wells	ea	6	$500	$3,000	
● Lease roll-off bin	ls	1	$1,000	$1,000	
● Dispose of drill cuttings as a non-hazardous waste (5)	ton	16	$44	$720	
● Dispose of development water as non-hazardous waste	drum	15	$150	$2,182	
				$44,902	$44,902

Table D-9

Estimated Capital Costs for Alternative 5 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Install Air Compressor System and Controls					
• Install system and controls at Building P Area	ls	1	$3,750	$3,750	
• Install above-grade conveyance piping	lf	200	$3	$600	
				$4,350	$4,350
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare plans and specifications	ls	1	$5,000	$5,000	
Conduct surveying of well locations	ls	1	$1,500	$1,500	
Bid, award, and negotiate installation contracts	ls	1	$2,500	$2,500	
• Construction observation					
Provide resident engineer	day	10	$1,000	$10,000	
Provide office support	day	5	$400	$2,000	
Provide vehicles and equipment	day	10	$260	$2,600	
Prepare completion report	ls	1	$10,000	$10,000	
				$43,600	$43,600
Engineering Project Management					
• 10 percent of Design and Construction Management Services		10%	--	--	$4,360
Decommission Existing IAS System					
• Abandon 6 IAS wells at Central Building P Area (6)	ea	6	$2,000	$12,000	
• Remove air compressor, hoses, and appurtenances	ls	1	$1,000	$1,000	
				$13,000	$13,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	1	$1,000	$1,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	1	$260	$260	
				$3,460	$3,460
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$346

Table D-9

Estimated Capital Costs for Alternative 5 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 4 soil vapor/groundwater monitoring wells (6)	ea	4	$2,000	$8,000	
				$8,000	$8,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$193,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$39,000*
Total Estimated Costs:					***$232,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Removal and disposal of concrete floor slab are assumed to be costs that will be incurred as part of building demolition and are not included herein.
(3) Approximate dimensions of clarifier are 10 feet long by 2.2 feet wide by 7.33 feet deep.
(4) Excavation is assumed to consist of petroleum hydrocarbon-containing soil to a depth of 5 feet below the base of the clarifier and 5 feet of soil around the circumference of the clarifier to a depth of 5 feet below the bottom of the clarifier.
(5) Density of soil is assumed to be 1.5 tons per cubic yard.
(6) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a subsurface obstruction.

Table D-10
Estimated Annual Costs for Alternative 5 - Central Building P Area
Excavate Subsurface Structures and Dispose Off-Site,
Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Operate and Monitor SVE System					
• Lease one 250 scfm blower	mo	12	$1,600	$19,200	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide electrical power for blower (2)	hp	10	$657	$6,570	
• Operate and maintain equipment	mo	12	$1,600	$19,200	
• Replace spent GAC (3)	lb	4,500	$1.68	$7,560	
• Transport and dispose of spent GAC by incineration	lb	4,500	$1.65	$7,425	
• Sample extraction wells and GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	96	$300	$28,800	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$110,955	$111,000
Monitor Soil Vapor					
• Sample, and conduct mobile laboratory analysis of samples from 4 vapor monitoring wells on quarterly basis	ea	4	$7,500	$30,000	
• Prepare quarterly report compiliing soil vapor monitoring data	ea	4	$1,500	$6,000	
				$36,000	$36,000
Conduct IAS in Groundwater					
Operate and Monitor IAS Systems					
• Lease one air compressor system	mo	12	$400	$4,800	
• Operate and monitor equipment	mo	12	$100	$1,200	
• Provide electrical power for air compressors (4)	hp	5	$657	$3,285	
• Replace additional spent GAC	lb	1,000	$1.68	$1,680	
• Transport and dispose of spent GAC by incineration	lb	1,000	$1.65	$1,650	
				$12,615	$12,615
Monitor Groundwater					
• Sample 4 groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	20	$158	$3,163	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	20	$76	$1,518	
Selected metals (EPA Method 6010)	ea	20	$190	$3,795	
• Prepare quarterly report compiling groundwater monitoriing data	ea	4	$1,500	$6,000	
				$22,476	$22,476
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$182,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$36,000*
Total Estimated Costs:					***$220,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 10 hp blower.
(3) Assumes GAC usage rate of 375 lbs/month, based on current operation of SVE systems.
(4) Assumes one 5 hp compressor.

Table D-11

Estimated Capital Costs for Alternative 6 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Excavate Subsurface Strucutres and Dispose Off-Site					
General Site Preparation					
• Mobilize contractor equipment and supplies to Site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Remove and Dispose of Clarifier and Excavate Impacted Soil					
• Remove/demolish and dispose of subsurface structure (2) (3)	ls	1	$5,000	$5,000	
• Excavate impacted soil and stockpile for characterization (4)	yd^3	100	$8	$800	
• Excavate surrounding clean soil at a 2:1 slope and stockpile for characterization and replacement	yd^3	363	$8	$2,902	
• Collect one confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	5	$200	$1,000	
• Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	5	$158	$791	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	5	$76	$380	
• Collect one 4 point composite soil sample for disposal profile per 50 yd^3 of stockpiled impacted soil	ea	2	$26	$52	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
Selected metals (EPA Method 6010)	ea	2	$190	$380	
WET extraction	ea	2	$63	$127	
TCLP extraction	ea	2	$63	$127	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	12	$32	$380	
• Collect one 4 point composite soil sample per 200 yd^3 of stockpiled clean soil	ea	2	$26	$52	
• Analyze clean soil characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
• Load characterized impacted soil into trucks (5)	ton	150	$5	$750	
• Transport and dispose of soil as non-hazardous waste	ton	150	$44	$6,600	
• Import, place, and compact clean fill	yd^3	100	$25	$2,500	
• Replace stockpiled clean soil	yd^3	363	$10	$3,628	
				$26,402	$26,402

Table D-11

Estimated Capital Costs for Alternative 6 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	3	$1,000	$3,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	3	$260	$780	
Conduct geotechnical and compaction testing	day	0.5	$650	$325	
Perform air monitoring	day	3	$200	$600	
Prepare completion report	ls	1	$10,000	$10,000	
				$19,105	$19,105
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,911
Perform SVE in Soil					
Decommission Existing SVE System					
• Abandon 4 SVE wells at Central Building P Area (6)	ea	4	$1,500	$6,000	
• Remove blower, treatment equipment, and appurtenances	ls	1	$5,000	$5,000	
• Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
				$8,300	$8,300
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	2	$260	$520	
				$4,720	$4,720
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$472
Extract and Treat Groundwater					
Construct Two Groundwater Extraction Wells at Central Building P Area					
• Permit well installation	ls	1	$1,000	$1,000	
• Install 4-in dia groundwater extraction wells to 80 ft bgs	ea	2	$6,000	$12,000	
• Develop groundwater extraction wells	ea	2	$500	$1,000	
• Pumps, gauges, controls, vaults, etc. for wellhead completion	ea	2	$5,000	$10,000	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Dispose of drill cuttings as a non-hazardous waste (5)	ton	5	$44	$213	
• Dispose of development water as non-hazardous waste	drum	6	$150	$900	
				$26,113	$26,113

Table D-11

Estimated Capital Costs for Alternative 6 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Install Conveyance and Treatment System					
• Install above-grade conveyance piping	lf	150	$5	$750	
• Purchase and install air stripper with 40 gpm capacity	ls	1	$22,000	$22,000	
• Install system and controls at Building P Area	ls	1	$5,000	$5,000	
				$27,750	$27,750
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare remedial design and implementation plan	ls	1	$10,000	$10,000	
Bid, award, and negotiate installation contracts	ls	1	$5,000	$5,000	
Obtain permit to discharge treated groundwater	ls	1	$5,000	$5,000	
• Construction Observation					
Provide resident engineer	day	5	$1,000	$5,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	5	$260	$1,300	
				$37,100	$37,100
Engineering Project Management					
• 10 percent of Design and Construction Management Services		10%	--	--	$3,710
Decommission Groundwater Extraction and Treatment System					
• Abandon 2 groundwater extraction wells at Central Building P Area (6)	ea	2	$2,000	$4,000	
• Remove air stripper, hoses, and appurtenances	ls	1	$2,000	$2,000	
				$6,000	$6,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	1	$1,000	$1,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	1	$260	$260	
				$3,460	$3,460
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$346

Table D-11

Estimated Capital Costs for Alternative 6 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 4 soil vapor/groundwater monitoring wells (6)	ea	4	$2,000	$8,000	
				$8,000	$8,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$184,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$37,000*
Total Estimated Costs:					***$221,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Removal and disposal of concrete floor slab are assumed to be costs that will be incurred as part of building demolition and are not included herein.

(3) Approximate dimensions of clarifier are 10 feet long by 2.2 feet wide by 7.33 feet deep.

(4) Excavation is assumed to consist of petroleum hydrocarbon-containing soil to a depth of 5 feet below the base of the clarifier and 5 feet of soil around the circumference of the clarifier to a depth of 5 feet below the bottom of the clarifier.

(5) Density of soil is assumed to be 1.5 tons per cubic yard.

(6) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a subsurface obstruction.

Table D-12

Estimated Annual Costs for Alternative 6 - Central Building P Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Operate and Monitor SVE System					
• Lease one 250 scfm blower	mo	12	$1,600	$19,200	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide electrical power for blower (2)	hp	10	$657	$6,570	
• Operate and maintain equipment	mo	12	$1,600	$19,200	
• Replace spent GAC (3)	lb	4,500	$1.68	$7,560	
• Transport and dispose of spent GAC by incineration	lb	4,500	$1.65	$7,425	
• Sample extraction wells and GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	96	$300	$28,800	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$110,955	$110,955
Monitor Soil Vapor					
• Sample, and conduct mobile laboratory analysis of samples from vapor monitoring wells on quarterly basis	ea	4	$7,500	$30,000	
• Prepare quarterly report compiling soil vapor monitoring data	ea	4	$1,500	$6,000	
				$36,000	$36,000
Extract and Treat Groundwater					
Operate and Monitor Extraction and Treatment System					
• Provide power to operate pumps (4)	hp	4	$657	$2,628	
• Operate and monitor equipment	mo	12	$1,000	$12,000	
• Replace spent additional GAC	lb	3,000	$1.68	$5,040	
• Transport and dispose of spent GAC by incineration	lb	3,000	$1.65	$4,950	
• Collect quarterly sample of effluent from each extraction well	ea	4	$500	$2,000	
• Analyze quarterly efflent samples by EPA Method 8260 wells by EPA Method 8260	ea	12	$158	$1,896	
				$28,514	$28,514
Monitor Groundwater					
• Sample groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	20	$158	$3,163	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	20	$76	$1,518	
Selected metals (EPA Method 6010)	ea	20	$190	$3,795	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$1,500	$6,000	
				$22,476	$22,476
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$198,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$40,000*
Total Estimated Costs:					***$240,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Assumes one 10 hp blower.

(3) Assumes GAC usage rate of 375 lbs/month, based on current operation of SVE systems.

(4) Assumes two 2 hp pumps.

Table D-13

Estimated Capital Costs for Alternative 2 - Building A Area Perform Complete Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Excavation at Building A Area					
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	\$5,000	\$5,000	
				\$5,000	\$5,000
Excavate Sixty Feet of Impacted Soil in Building A					
• Remove and dispose of contaminated concrete (2)	ls	1	\$5,000	\$5,000	
• Drive, extract, and salvage sheeting and shoring to 90 ft deep	ft^2	76,050	\$25	\$1,901,250	
• Excavate impacted soil and stockpile for characterization (3)	yd^3	25,000	\$8	\$200,000	
• Collect one 4 point composite confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	32	\$200	\$6,400	
• Analyze confirmation soil samples					
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	32	\$76	\$2,429	
• Collect one 4 point composite soil sample for disposal profile per 200 yd^3 of stockpiled soil	ea	125	\$26	\$3,250	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	125	\$158	\$19,766	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	125	\$76	\$9,488	
Selected metals (EPA Method 6010)	ea	125	\$190	\$23,719	
WET extraction	ea	125	\$63	\$7,906	
TCLP extraction	ea	125	\$63	\$7,906	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	750	\$32	\$23,719	
• Load characterized soil into trucks (4)	ton	37,500	\$5	\$187,500	
• Transport and dispose of soil as non-hazardous waste	ton	37,500	\$44	\$1,650,000	
• Import, place, and compact fill	yd^3	25,000	\$25	\$625,000	
				\$4,673,332	\$4,673,332

Table D-13

Estimated Capital Costs for Alternative 2 - Building A Area Perform Complete Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$5,000	$5,000	
Prepare plans and specifications	ls	1	$10,000	$10,000	
• Construction observation					
Provide resident engineer	day	25	$1,000	$25,000	
Provide office support	day	10	$400	$4,000	
Provide vehicles and equipment	day	25	$260	$6,500	
Conduct geotechnical and compaction testing	day	1	$650	$650	
Perform air monitoring	day	25	$200	$5,000	
Prepare completion report	ls	1	$10,000	$10,000	
				$66,150	$66,150
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$6,615
Collect FHP From Groundwater at Building A Area					
Connect Wells and Automate FHP Collection System					
• Install pumps in Wells PMW-16, PMW-17, and PMW-18	ea	3	$3,000	$9,000	
• Purchase and install collection tank and air compressor	ls	1	$10,000	$10,000	
• Provide transfer hoses, valves, connections	ls	1	$5,000	$5,000	
				$24,000	$24,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$5,000	$5,000	
Prepare plans and specifications	ls	1	$5,000	$5,000	
• Construction observation					
Provide resident engineer	day	1	$1,000	$1,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	1	$260	$260	
				$11,460	$11,460
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,146
Decommission Existing FHP Collection System					
• Abandon 6 FHP collection wells at Building A Area (5)	ea	6	$1,500	$9,000	
• Remove air compressor, hoses, tank, and appurtenances	ls	1	$2,500	$2,500	
				$11,500	$11,500

Table D-13

Estimated Capital Costs for Alternative 2 - Building A Area Perform Complete Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Construct Thirteen FHP Collection Wells in Building A Area					
• Permit well installation	ls	1	$2,000	$2,000	
• Install 6-in dia FHP collection wells to 80 ft bgs	ea	13	$3,500	$45,500	
• Install pumps, vaults, valves for each well	ea	13	$3,000	$39,000	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Dispose of drill cuttings as a non-hazardous waste (4)	ton	142	$44	$6,240	
				$93,740	$93,740
Install FHP Conveyance Piping					
• Sawcut 3 foot wide trenches for a length of 315 ft	lf	630	$3.65	$2,299	
• Excavate 3 ft wide x 3 ft deep trenches for a length of 315 ft	lf	315	$9.00	$2,835	
• Install 2-in dia inside 4-in dia PVC piping	lf	315	$10	$3,150	
• Supply trench with sand fill	yd^3	105	$20	$2,100	
• Resurface over trenches	ft^2	945	$3.50	$3,308	
• Transport and dispose of soil as non-hazardous waste	ton	158	$44	$6,930	
				$20,621	$20,621
Install FHP Collection System					
• Construct enclosure with sound-proofing	ls	1	$15,000	$15,000	
• Reinstall collection tank and air compressor (6)	ls	1	$10,000	$10,000	
• Provide transfer hoses, valves, and apputenances	ls	1	$5,000	$5,000	
				$30,000	$30,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare plans and specifications	ls	1	$10,000	$10,000	
• Construction Observation					
Provide resident engineer	day	20	$1,000	$20,000	
Provide office support	day	7	$400	$2,800	
Provide vehicles and equipment	day	20	$200	$4,000	
Prepare completion report	ls	1	$20,000	$20,000	
				$66,800	$66,800

Table D-13

Estimated Capital Costs for Alternative 2 - Building A Area Perform Complete Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$6,680
Decommission FHP Collection System					
• Abandon 13 FHP collection wells at Building A Area (5)	ea	13	$2,500	$32,500	
• Remove air compressor, hoses, tank, and appurtenances	ls	1	$5,000	$5,000	
				$37,500	$37,500
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	5	$1,000	$5,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	5	$260	$1,300	
				$9,100	$9,100
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$910
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$5,100,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$1,000,000*
Total Estimated Costs:					***$6,100,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Removal and disposal of uncontaminated concrete floor slab are assumed to be costs that will be incurred as part of demolition of buildings and other improvements at the Price Pfister property associated with redevelopment of the Site.

(3) Excavation is assumed to consist of petroleum hydrocarbon-containing soil to a depth of 60 feet below ground surface.

(4) Density of excavated soil is assumed to be 1.5 tons per cubic yard.

(5) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to avoid the abandoned well from being a subsurface obstruction.

(6) Cost estimate assumes FHP collection system equipment decommissioned prior to redevelopment can be reused.

Table D-14

Estimated Annual Costs for Alternative 2 - Building A Area Perform Complete Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater Prior to Redevelopment

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Collect FHP From Groundwater at Building A Area					
Operate and Monitor FHP Colletion System					
• Provide electrical power for air compressor (2)	hp	5	$657	$3,285	
• Operate and monitor equipment	mo	12	$1,500	$18,000	
• Transport and dispose of collected FHP (3)	gal	1,440	$2.50	$3,600	
				$24,885	$24,885
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$25,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$5,000*
Total Estimated Costs:					***$30,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 5 hp compressor.
(3) Assumes collection of 20 gallons of FHP from each collection well every month.

Table D-15

Estimated Annual Costs for Alternative 2 - Building A Area Perform Complete Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater After Redevelopment

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Collect FHP From Groundwater at Building A Area					
Operate and Monitor FHP Colletion System					
• Provide electrical power for air compressor (2)	hp	5	$657	$3,285	
• Operate and monitor equipment	mo	12	$1,500	$18,000	
• Transport and dispose of collected FHP (3)	gal	3,120	$2.50	$7,800	
				$29,085	$29,085
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$29,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$6,000*
Total Estimated Costs:					***$35,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 5 hp compressor.
(3) Assumes collection of 20 gallons of FHP from each collection well every month.

Table D-16
Estimated Capital Costs for Alternative 3 - Building A Area Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Excavation at Building A Area					
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Excavate Three Feet of Impacted Soil in Building A					
• Remove and dispose of contaminated concrete (2)	ls	1	$5,000	$5,000	
• Excavate impacted soil and stockpile for characterization (3)	yd^3	1,200	$8	$9,600	
• Excavate surrounding soil at a 2:1 slope and stockpile for characterization and replacement	yd^3	338	$8	$2,704	
• Collect one 4 point composite confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	20	$200	$4,000	
• Analyze confirmation soil samples TPHd, with silica gel cleanup (EPA Method 8015M)	ea	20	$76	$1,518	
• Collect one 4 point composite soil sample for disposal profile per 200 yd^3 of stockpiled soil	ea	6	$26	$156	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	6	$158	$949	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	6	$76	$455	
Selected metals (EPA Method 6010)	ea	6	$190	$1,139	
WET extraction	ea	6	$63	$380	
TCLP extraction	ea	6	$63	$380	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	36	$32	$1,139	
• Collect one 4 point composite soil sample per 200 yd^3 of stockpiled clean soil	ea	2	$26	$52	
• Analyze clean soil characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
• Load characterized soil into trucks (4)	ton	1,800	$5	$9,000	
• Transport and dispose of soil as non-hazardous waste	ton	1,800	$44	$79,200	
• Import, place, and compact fill	yd^3	1,200	$25	$30,000	
• Replace and compact stockpiled clean soil	yd^3	338	$10	$3,380	
				$149,518	$149,518

Table D-16

Estimated Capital Costs for Alternative 3 - Building A Area Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	10	$1,000	$10,000	
Provide office support	day	4	$400	$1,600	
Provide vehicles and equipment	day	10	$260	$2,600	
Conduct geotechnical and compaction testing	day	1	$650	$650	
Perform air monitoring	day	10	$200	$2,000	
Prepare completion report	ls	1	$10,000	$10,000	
				$30,850	$30,850
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$3,085
Collect FHP From Groundwater at Building A Area					
Connect Wells and Automate FHP Collection System					
• Install pumps in Wells PMW-16, PMW-17, and PMW-18	ea	3	$3,000	$9,000	
• Purchase and install collection tank and air compressor	ls	1	$10,000	$10,000	
• Provide transfer hoses, valves, connections	ls	1	$5,000	$5,000	
				$24,000	$24,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$5,000	$5,000	
Prepare plans and specifications	ls	1	$5,000	$5,000	
• Construction observation					
Provide resident engineer	day	1	$1,000	$1,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	1	$260	$260	
				$11,460	$11,460
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,146
Decommission Existing FHP Collection System					
• Abandon 6 FHP collection wells at Building A Area (5)	ea	6	$1,500	$9,000	
• Remove air compressor, hoses, tank, and appurtenances	ls	1	$2,500	$2,500	
				$11,500	$11,500

Table D-16

Estimated Capital Costs for Alternative 3 - Building A Area Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Construct Thirteen FHP Collection Wells in Building A Area					
• Permit well installation	ls	1	$2,000	$2,000	
• Install 6-in dia FHP collection wells to 80 ft bgs	ea	13	$3,500	$45,500	
• Install pumps, vaults, valves for each well	ea	13	$3,000	$39,000	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Dispose of drill cuttings as a non-hazardous waste (4)	ton	142	$44	$6,240	
				$93,740	$93,740
Install FHP Conveyance Piping					
• Sawcut 3 foot wide trenches for a length of 315 ft	lf	630	$3.65	$2,299	
• Excavate 3 ft wide x 3 ft deep trenches for a length of 315 ft	lf	315	$9.00	$2,835	
• Install 2-in dia inside 4-in dia PVC piping	lf	315	$10	$3,150	
• Supply trench with sand fill	yd^3	105	$20	$2,100	
• Resurface over trenches	ft^2	945	$3.50	$3,308	
• Transport and dispose of soil as non-hazardous waste (4)	ton	158	$44	$6,930	
				$20,621	$20,621
Install FHP Collection System					
• Construct enclosure with sound-proofing	ls	1	$15,000	$15,000	
• Reinstall collection tank and air compressor (6)	ls	1	$10,000	$10,000	
• Provide transfer hoses, valves, and apputenances	ls	1	$5,000	$5,000	
				$30,000	$30,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare plans and specifications	ls	1	$10,000	$10,000	
• Construction Observation					
Provide resident engineer	day	20	$1,000	$20,000	
Provide office support	day	7	$400	$2,800	
Provide vehicles and equipment	day	20	$200	$4,000	
Prepare completion report	ls	1	$20,000	$20,000	
				$66,800	$66,800

Table D-16

Estimated Capital Costs for Alternative 3 - Building A Area Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Unit	Quantity	Unit Cost	Subtotal	Total (1)
	Estimated Costs				
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$6,680
Decommission FHP Collection System					
• Abandon 13 FHP collection wells at Building A Area (5)	ea	13	$2,500	$32,500	
• Remove air compressor, hoses, tank, and appurtenances	ls	1	$5,000	$5,000	
				$37,500	$37,500
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	5	$1,000	$5,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	5	$260	$1,300	
				$9,100	$9,100
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$910
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$188,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$38,000*
Total Estimated Costs:					***$230,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Removal and disposal of uncontaminated concrete floor slab are assumed to be costs that will be incurred as part of demolition of buildings and other improvements at the Price Pfister property associated with redevelopment of the Site.

(3) Excavation is assumed to consist of petroleum hydrocarbon-containing soil to a depth of 3 feet below ground surface.

(4) Density of soil is assumed to be 1.5 tons per cubic yard.

(5) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to avoid the abandoned well from being a subsurface obstruction.

(6) Cost estimate assumes FHP collection system equipment decommissioned prior to redevelopment can be reused.

Table D-17

Estimated Annual Costs for Alternative 3 - Building A Area Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater Prior to Redevelopment

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Collect FHP From Groundwater at Building A Area					
Operate and Monitor FHP Colletion System					
• Provide electrical power for air compressor (2)	hp	5	$657	$3,285	
• Operate and monitor equipment	month	12	$1,500	$18,000	
• Transport and dispose of collected FHP (3)	gallon	1,440	$2.50	$3,600	
				$24,885	$24,885
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$25,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$5,000*
Total Estimated Costs:					***$30,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 5 hp compressor.
(3) Assumes collection of 20 gallons of FHP from each collection well every month.

Table D-18

Estimated Annual Costs for Alternative 3 - Building A Area Perform Limited Excavation of Soil and Dispose Off-Site, and Collect FHP From Groundwater After Redevelopment

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Collect FHP From Groundwater at Building A Area					
Operate and Monitor FHP Colletion System					
• Provide electrical power for air compressor (2)	hp	5	$657	$3,285	
• Operate and monitor equipment	month	12	$1,500	$18,000	
• Transport and dispose of collected FHP (3)	gallon	3,120	$2.50	$7,800	
				$29,085	$29,085
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$29,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$6,000*
Total Estimated Costs:					***$35,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 5 hp compressor.
(3) Assumes collection of 20 gallons of FHP from each collection well every month.

Table D-19

Estimated Capital Costs for Alternative 2 - Oil Staging Area Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Decommission Existing SVE System					
• Abandon 3 SVE wells at Oil Staging Area (2)	ea	3	$1,500	$4,500	
• Remove blower, treatment equipment, and appurtenances	ls	1	$5,000	$5,000	
• Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
				$8,300	$8,300
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	2	$260	$520	
				$4,720	$4,720
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$472
Monitor Natural Attenuation in Groundwater					
Abandon Groundwater Monitoring Wells					
• Abandon 3 soil vapor/groundwater or groundwater monitoring wells (2)	ea	3	$2,000	$6,000	
				$6,000	$6,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492

Table D-19

Estimated Capital Costs for Alternative 2 - Oil Staging Area Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Construct Three Groundwater Monitoring Wells					
• Permit well installation	ls	1	$1,000	$1,000	
• Install 4-inch diameter groundwater monitoring well s to 80 ft bgs	ea	3	$3,000	$9,000	
• Develop groundwater monitoring wells	ea	3	$350	$1,050	
• Provide cap and vault for each well	ea	3	$400	$1,200	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Transport and dispose of drill cuttings as non-hazardous waste (3)	ton	21	$44	$922	
• Transport and dispose of development water	drum	9	$150	$1,350	
				$15,522	$15,522
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	5	$1,000	$5,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	5	$260	$1,300	
				$11,100	$11,100
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,110
Abandon Groundwater Monitoring Wells					
• Abandon 3 groundwater monitoring wells (2)	ea	3	$2,000	$6,000	
				$6,000	$6,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction Observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920

Table D-19

Estimated Capital Costs for Alternative 2 - Oil Staging Area Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$69,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$14,000*
Total Estimated Costs:					***$83,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to the abandoned well from being a subsurface obstruction.

(3) Density of soil is assumed to be 1.5 tons per cubic yard.

Table D-20

Estimated Annual Costs for Alternative 2 - Oil Staging Area Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater Prior to Redevelopment

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Operate and Monitor SVE System					
• Lease one 250 scfm blower	mo	12	$1,600	$19,200	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide electrical power for blower (2)	hp	10	$657	$6,570	
• Operate and maintain equipment	mo	12	$1,600	$19,200	
• Replace spent GAC (3)	lb	3,600	$1.68	$6,048	
• Transport and dispose of spent GAC by incineration	lb	3,600	$1.65	$5,940	
• Sample extraction wells and GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	84	$300	$25,200	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$104,358	$104,358
Monitor Soil Vapor					
• Sample, and conduct mobile laboratory analysis of samples from 3 vapor monitoring wells on quarterly basis	ea	4	$7,500	$30,000	
• Prepare quarterly report compiling soil vapor monitoring data	ea	4	$1,500	$6,000	
				$36,000	$36,000
Monitor Natural Attenuation in Groundwater					
Sample Groundwater Monitoring Wells					
• Sample 3 groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	15	$158	$2,372	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	15	$76	$1,139	
Selected metals (EPA Method 6010)	ea	15	$190	$2,846	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$1,500	$6,000	
				$20,357	$20,357
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$161,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$32,000*
Total Estimated Costs:					***$190,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 10 hp blower.
(3) Assumes GAC usage rate of 300 lbs/month, based on current operation of SVE systems.

Table D-21

Estimated Annual Costs for Alternative 2 - Oil Staging Area Perform SVE in Soil, and Monitor Natural Attenuation in Groundwater After Redevelopment

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Monitor Natural Attenuation in Groundwater					
Sample Groundwater Monitoring Wells					
• Sample 3 groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	15	$158	$2,372	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	15	$76	$1,139	
Selected metals (EPA Method 6010)	ea	15	$190	$2,846	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$2,000	$8,000	
				$22,357	$22,357
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$22,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$4,000*
Total Estimated Costs:					***$30,000***

<u>Notes</u>

(1) Totals may not sum exactly due to rounding.

Table D-22

Estimated Capital Costs for Alternative 3 - Oil Staging Area Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Decommission Existing SVE System					
● Abandon 3 SVE wells at Oil Staging Area (2)	ea	3	$1,500	$4,500	
● Remove blower, treatment equipment, and appurtenances	ls	1	$5,000	$5,000	
● Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
				$8,300	$8,300
Design and Construction Management Services					
● Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
● Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	2	$260	$520	
				$4,720	$4,720
Engineering Project Management					
● 10 percent of Design and Construction Management Services	ls	10%	--	--	$472
Conduct IAS in Groundwater					
Construct Six Air Sparging Wells at Central Building P Area					
● Permit well installation	ls	1	$2,000	$2,000	
● Install 2-in dia IAS wells to 90 ft bgs	ea	6	$6,000	$36,000	
● Develop IAS wells	ea	6	$500	$3,000	
● Lease roll-off bin	ls	1	$1,000	$1,000	
● Dispose of drill cuttings as a non-hazardous waste (3)	ton	16	$44	$720	
● Dispose of development water as non-hazardous waste	drum	15	$150	$2,182	
				$44,902	$44,902
Install Air Compressor System and Controls					
● Install system and controls at Building P Area	ls	1	$3,750	$3,750	
● Install above-grade conveyance piping	lf	200	$3	$600	
				$4,350	$4,350
Design and Construction Management Services					
● Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare plans and specifications	ls	1	$5,000	$5,000	
Conduct surveying of well locations	ls	1	$1,500	$1,500	
Bid, award, and negotiate installation contracts	ls	1	$2,500	$2,500	
● Construction observation					
Provide resident engineer	day	10	$1,000	$10,000	
Provide office support	day	5	$400	$2,000	
Provide vehicles and equipment	day	10	$260	$2,600	
Prepare completion report	ls	1	$10,000	$10,000	
				$43,600	$43,600

Table D-22

Estimated Capital Costs for Alternative 3 - Oil Staging Area Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Engineering Project Management					
• 10 percent of Design and Construction Management Services		10%	--	--	$4,360
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 3 soil vapor/groundwater monitoring wells (2)	ea	3	$2,000	$6,000	
				$6,000	$6,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$122,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$24,000*
Total Estimated Costs:					***$146,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a subsurface obstruction.

(3) Density of soil is assumed to be 1.5 tons per cubic yard.

Table D-23

Estimated Annual Costs for Alternative 3 - Oil Staging Area Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Operate and Monitor SVE System					
• Lease one 250 scfm blower	mo	12	$1,600	$19,200	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide electrical power for blower (2)	hp	10	$657	$6,570	
• Operate and maintain equipment	mo	12	$1,600	$19,200	
• Replace spent GAC (3)	lb	3,600	$1.68	$6,048	
• Transport and dispose of spent GAC by incineration	lb	3,600	$1.65	$5,940	
• Sample extraction wells and GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	84	$300	$25,200	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$104,358	$104,358
Monitor Soil Vapor					
• Sample, and conduct mobile laboratory analysis of samples from 3 vapor monitoring wells on quarterly basis	ea	4	$7,500	$30,000	
• Prepare quarterly report compiling soil vapor monitoring data	ea	4	$1,500	$6,000	
				$36,000	$36,000
Conduct IAS in Groundwater					
Operate and Monitor IAS Systems					
• Lease one air compressor system	mo	12	$400	$4,800	
• Operate and monitor equipment	mo	12	$100	$1,200	
• Provide electrical power for air compressor (4)	hp	5	$657	$3,285	
• Replace additional spent GAC	lb	1,000	$1.68	$1,680	
• Transport and dispose of spent GAC by incineration	lb	1,000	$1.65	$1,650	
				$12,615	$12,615
Monitor Groundwater					
• Sample 3 groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	15	$158	$2,372	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	15	$76	$1,139	
Selected metals (EPA Method 6010)	ea	15	$190	$2,846	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$1,500	$6,000	
				$20,357	$20,357
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$173,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$35,000*
Total Estimated Costs:					***$210,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 10 hp blower.
(3) Assumes GAC usage rate of 300 lbs/month, based on current operation of SVE systems.
(4) Assumes one 5 hp compressor.

Table D-24

Estimated Capital Costs for Alternative 4 - Oil Staging Area
Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Excavate Soil and Dispose Off-Site					
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Remove and Dispose of Contaminated Soil Beneath at Containment Sump					
• Remove/demolish and dispose of subsurface structure (2) (3)	ls	1	$5,000	$5,000	
• Drive, extract, and salvage sheeting and shoring to 10 ft deep	ft^2	5,014	$25	$125,340	
• Excavate impacted soil and stockpile for characterization (4)	yd^3	600	$8	$4,800	
• Collect one confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	10	$200	$2,000	
• Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	10	$158	$1,581	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	10	$76	$759	
• Collect one 4 point composite soil sample for disposal profile per 200 yd^3 of stockpiled impacted soil	ea	3	$26	$78	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	3	$158	$474	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	3	$76	$228	
Selected metals (EPA Method 6010)	ea	3	$190	$569	
WET extraction	ea	3	$63	$190	
TCLP extraction	ea	3	$63	$190	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	18	$32	$569	
• Load characterized impacted soil into trucks (5)	ton	900	$5	$4,500	
• Transport and dispose of 75% of soil as non-hazardous waste	ton	675	$44	$29,700	
• Transport and dispose of 25% of soil as non-RCRA hazardous waste	ton	225	$44	$9,900	
• Import, place, and compact clean fill	yd^3	600	$25	$15,000	
				$200,878	$200,878

Table D-24

Estimated Capital Costs for Alternative 4 - Oil Staging Area Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
● Engineering					
Perform general planning activities	ls	1	$5,000	$5,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
● Construction observation					
Provide resident engineer	day	10	$1,000	$10,000	
Provide office support	day	4	$400	$1,600	
Provide vehicles and equipment	day	10	$260	$2,600	
Conduct geotechnical and compaction testing	day	1	$650	$650	
Perform air monitoring	day	10	$200	$2,000	
Prepare completion report	ls	1	$10,000	$10,000	
				$33,850	$33,850
Engineering Project Management					
● 10 percent of Design and Construction Management Services	ls	10%	--	--	$3,385
Extract and Treat Groundwater					
Construct One Groundwater Extraction Well at Oil Staging Area					
● Permit well installation	ls	1	$1,000	$1,000	
● Install 4-in dia groundwater extraction wells to 80 ft bgs	ea	1	$6,000	$6,000	
● Develop groundwater extraction wells	ea	1	$500	$500	
● Pumps, gauges, controls, vaults, etc. for wellhead completion	ea	1	$5,000	$5,000	
● Lease roll-off bin	ls	1	$1,000	$1,000	
● Dispose of drill cuttings as a non-hazardous waste (5)	ton	2	$44	$107	
● Dispose of development water as non-hazardous waste	drum	3	$150	$450	
				$14,057	$14,057

Table D-24

Estimated Capital Costs for Alternative 4 - Oil Staging Area Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Install Conveyance and Treatment System					
• Install above-grade conveyance piping	lf	100	$5	$500	
• Purchase and install air stripper with 20 gpm capacity	ls	1	$15,000	$15,000	
• Install a leased soil vapor treament system, each consisting of two 1,000 pound GAC contactors in series	ea	1	$5,000	$5,000	
				$20,500	$20,500
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare remedial design and implementation plan	ls	1	$10,000	$10,000	
Bid, award, and negotiate installation contracts	ls	1	$5,000	$5,000	
Obtain permit to discharge treated groundwater	ls	1	$5,000	$5,000	
• Construction Observation					
Provide resident engineer	day	5	$1,000	$5,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	5	$260	$1,300	
				$37,100	$37,100
Engineering Project Management					
• 10 percent of Design and Construction Management Services		10%	--	--	$3,710
Decommission Groundwater Extraction and Treatment System					
• Abandon 1 groundwater extraction well at Oil Staging Area (6)	ea	1	$2,000	$2,000	
• Remove air stripper, hoses, and appurtenances	ls	1	$2,000	$2,000	
				$4,000	$4,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	1	$1,000	$1,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	1	$260	$260	
				$3,460	$3,460
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$346

Table D-24

Estimated Capital Costs for Alternative 4 - Oil Staging Area Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 3 soil vapor/groundwater or groundwater monitoring wells (6)	ea	4	$2,000	$8,000	
				$8,000	$8,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,900
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$490
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Construct Three Groundwater Monitoring Wells					
• Permit well installation	ls	1	$1,000	$1,000	
• Install 4-inch diameter groundwater monitoring wells to 80 ft bgs	ea	3	$3,000	$9,000	
• Develop groundwater monitoring wells	ea	3	$350	$1,050	
• Provide cap and vault for each well	ea	3	$400	$1,200	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Transport and dispose of drill cuttings as non-hazardous waste (5)	ton	21	$44	$922	
• Transport and dispose of development water	drum	9	$150	$1,350	
				$15,522	$15,522
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	5	$1,000	$5,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	5	$260	$1,300	
				$11,100	$11,100
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,110
Abandon Groundwater Monitoring Wells					
• Abandon 3 groundwater monitoring wells (6)	ea	4	$2,000	$8,000	
				$8,000	$8,000

Table D-24

Estimated Capital Costs for Alternative 4 - Oil Staging Area
Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction Observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$386,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$77,000*
Total Estimated Costs:					***$463,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Removal and disposal of concrete slab are assumed to be costs that will be incurred as part of building demolition and are not included herein.
(3) Approximate dimensions of containment sump are 7.67 feet long by 6.67 feet wide by 3.5 feet deep.
(4) Excavation is assumed to consist of PCE- and petroleum hydrocarbon-containing soil to a depth of 25 feet and 5 feet of soil around the circumference of the clarifier to a depth of 25 feet and PCE-containing soil to a depth of 35 feet beneath an area that is 25 feet by 10 feet.
(5) Density of soil is assumed to be 1.5 tons per cubic yard.
(6) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a subsurface obstruction.

Table D-25

Estimated Annual Costs for Alternative 4 - Oil Staging Area Excavate Soil and Dispose Off-Site, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Extract and Treat Groundwater					
Operate and Monitor Systems for One Year					
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide power to operate pump (2)	hp	2	$657	$1,314	
• Operate and maintain equipment	mo	12	$1,000	$12,000	
• Replace spent GAC	lb	2,000	$1.68	$3,360	
• Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
• Collect quarterly sample of effluent from each extraction well	ea	4	$500	$2,000	
• Analyze quarterly efflent samples by EPA Method 8260 wells by EPA Method 8260	ea	10	$158	$1,580	
• Sample GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	36	$300	$10,800	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$56,554	$56,554
Monitor Groundwater					
• Sample 3 groundwater monitoring wells on quarterly basis	ea	3	$2,000	$6,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	15	$158	$2,372	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	15	$76	$1,139	
Selected metals (EPA Method 6010)	ea	15	$190	$2,846	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$2,000	$8,000	
				$20,357	$20,357
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$77,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$15,000*
Total Estimated Costs:					***$90,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Assumes one 2 hp pump.

Table D-26

Estimated Capital Costs for Alternative 5 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Excavate Subsurface Structures and Dispose Off-Site					
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Remove and Dispose of Containment Sump and Excavate Impacted Soil					
• Remove/demolish and dispose of subsurface structure (2) (3)	ls	1	$5,000	$5,000	
• Excavate impacted soil and stockpile for characterization (4)	yd^3	100	$8	$800	
• Excavate surrounding soil at a 2:1 slope and stockpile for characterization and replacement	yd^3	184	$8	$1,470	
• Collect one confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	5	$200	$1,000	
• Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	5	$158	$791	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	5	$76	$380	
• Collect one 4 point composite soil sample for disposal profile per 50 yd^3 of stockpiled impacted soil	ea	2	$26	$52	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
Selected metals (EPA Method 6010)	ea	2	$190	$380	
WET extraction	ea	2	$63	$127	
TCLP extraction	ea	2	$63	$127	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	12	$32	$380	
• Collect one 4 point composite soil sample per 200 yd^3 of stockpiled clean soil	ea	1	$26	$26	
• Analyze clean soil characterization samples					
VOCs (EPA Method 8260)	ea	1	$158	$158	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	1	$76	$76	
• Load characterized impacted soil into trucks	ton	150	$5	$750	
• Transport and dispose of soil as non-hazardous waste (5)	ton	150	$44	$6,600	
• Import, place, and compact clean fill	yd^3	100	$25	$2,500	
				$21,082	$21,082

Table D-26

Estimated Capital Costs for Alternative 5 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	3	$1,000	$3,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	3	$260	$780	
Conduct geotechnical and compaction testing	day	0.5	$650	$325	
Perform air monitoring	day	3	$200	$600	
Prepare completion report	ls	1	$10,000	$10,000	
				$19,105	$19,105
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,911
Perform SVE in Soil					
Decommission Existing SVE System					
• Abandon 3 SVE wells at Oil Staging Area (6)	ea	3	$1,500	$4,500	
• Remove blower, treatment equipment, and appurtenances	ls	1	$5,000	$5,000	
• Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
				$8,300	$8,300
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	2	$260	$520	
				$4,720	$4,720
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$472
Conduct IAS in Groundwater					
Construct Six Air Sparging Wells at Oil Staging Area					
• Permit well installation	ls	1	$2,000	$2,000	
• Install 2-in dia IAS wells to 90 ft bgs	ea	6	$6,000	$36,000	
• Develop IAS wells	ea	6	$500	$3,000	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Dispose of drill cuttings as a non-hazardous waste (5)	ton	16	$44	$720	
• Dispose of development water as non-hazardous waste	drum	15	$150	$2,182	
				$44,902	$44,902

Table D-26

Estimated Capital Costs for Alternative 5 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Install Air Compressor System and Controls					
• Install system and controls at Oil Staging Area	ls	1	$3,750	$3,750	
• Install above-grade conveyance piping	lf	200	$3	$600	
				$4,350	$4,350
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare plans and specifications	ls	1	$5,000	$5,000	
Conduct surveying of well locations	ls	1	$1,500	$1,500	
Bid, award, and negotiate installation contracts	ls	1	$2,500	$2,500	
• Construction observation					
Provide resident engineer	day	10	$1,000	$10,000	
Provide office support	day	5	$400	$2,000	
Provide vehicles and equipment	day	10	$260	$2,600	
Prepare completion report	ls	1	$10,000	$10,000	
				$43,600	$43,600
Engineering Project Management					
• 10 percent of Design and Construction Management Services		10%	--	--	$4,360
Monitor Groundwater					
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 3 soil vapor/groundwater or groundwater monitoring wells (6)	ea	3	$2,000	$6,000	
				$6,000	$6,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,900

Table D-26

Estimated Capital Costs for Alternative 5 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$490
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$169,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$34,000*
Total Estimated Costs:					***$203,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Removal and disposal of concrete slab are assumed to be costs that will be incurred as part of building demolition and are not included herein.

(3) Approximate dimensions of containment sump are 7.67 feet long by 6.67 feet wide by 3.5 feet deep.

(4) Excavation is assumed to consist of PCE- and petroleum hydrocarbon-containing soil to a depth of 5 feet below the base of the containment sump and 5 feet of soil around the circumference of the sump to a depth of 5 feet below the bottom of the sump.

(5) Density of soil is assumed to be 1.5 tons per cubic yard.

(6) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a subsurface obstruction.

Table D-27

Estimated Annual Costs for Alternative 5 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Conduct IAS in Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Operate and Monitor SVE System					
• Lease one 250 scfm blower	mo	12	$1,600	$19,200	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide electrical power for blower (2)	hp	10	$657	$6,570	
• Operate and maintain equipment	mo	12	$1,600	$19,200	
• Replace spent GAC (3)	lb	3,600	$1.68	$6,048	
• Transport and dispose of spent GAC by incineration	lb	3,600	$1.65	$5,940	
• Sample extraction wells and GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	84	$300	$25,200	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$104,358	$104,358
Monitor Soil Vapor					
• Sample, and conduct mobile laboratory analysis of samples from vapor monitoring wells on quarterly basis	ea	4	$7,500	$30,000	
• Prepare quarterly report compiling soil vapor monitoring data	ea	4	$1,500	$6,000	
				$36,000	$36,000
Conduct IAS in Groundwater					
Operate and Monitor IAS Systems					
• Lease one air compressor system	mo	12	$400	$4,800	
• Operate and monitor equipment	mo	12	$100	$1,200	
• Provide electrical power for air compressor (4)	hp	5	$657	$3,285	
• Replace additional spent GAC	lb	1,000	$1.68	$1,680	
• Transport and dispose of spent GAC by incineration	lb	1,000	$1.65	$1,650	
				$12,615	$12,615
Monitor Groundwater					
• Sample groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	15	$158	$2,372	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	15	$76	$1,139	
Selected metals (EPA Method 6010)	ea	15	$190	$2,846	
• Prepare quarterly report compiling groundwater monitoring data	ea	4	$1,500	$6,000	
				$20,357	$20,357
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$173,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$35,000*
Total Estimated Costs:					***$210,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 10 hp blower.
(3) Assumes GAC usage rate of 300 lbs/month, based on current operation of SVE systems.
(4) Assumes one 5 hp compressor.

Table D-28

Estimated Capital Costs for Alternative 6 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Excavate Subsurface Structures and Dispose Off-Site					
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Remove and Dispose of Containment Sump and Excavate Impacted Soil					
• Remove/demolish and dispose of subsurface structure (2) (3)	ls	1	$5,000	$5,000	
• Excavate impacted soil and stockpile for characterization (4)	yd^3	100	$8	$800	
• Excavate surrounding soil at a 2:1 slope and stockpile for characterization and replacement	yd^3	184	$8	$1,470	
• Collect one confirmation soil sample per 2,500 ft^2 of floor and sidewall surface area	ea	5	$200	$1,000	
• Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	5	$158	$791	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	5	$76	$380	
• Collect one 4 point composite soil sample for disposal profile per 50 yd^3 of stockpiled impacted soil	ea	2	$26	$52	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	2	$158	$316	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	2	$76	$152	
Selected metals (EPA Method 6010)	ea	2	$190	$380	
WET extraction	ea	2	$63	$127	
TCLP extraction	ea	2	$63	$127	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	12	$32	$380	
• Collect one 4 point composite soil sample per 200 yd^3 of stockpiled clean soil	ea	1	$26	$26	
• Analyze clean soil characterization samples					
VOCs (EPA Method 8260)	ea	1	$158	$158	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	1	$76	$76	
• Load characterized impacted soil into trucks	ton	150	$5	$750	
• Transport and dispose of soil as non-hazardous waste (5)	ton	150	$44	$6,600	
• Import, place, and compact clean fill	yd^3	100	$25	$2,500	
				$21,082	$21,082

Table D-28

Estimated Capital Costs for Alternative 6 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	3	$1,000	$3,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	3	$260	$780	
Conduct geotechnical and compaction testing	day	0.5	$650	$325	
Perform air monitoring	day	3	$200	$600	
Prepare completion report	ls	1	$10,000	$10,000	
				$19,105	$19,105
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$1,911
Perform SVE in Soil					
Decommission Existing SVE System					
• Abandon 3 SVE wells at Oil Staging Area (6)	ea	3	$1,500	$4,500	
• Remove blower, treatment equipment, and appurtenances	ls	1	$5,000	$5,000	
• Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
				$8,300	$8,300
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	2	$260	$520	
				$4,720	$4,720
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$472

Table D-28

Estimated Capital Costs for Alternative 6 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Extract and Treat Groundwater					
Construct One Groundwater Extraction Well at Oil Staging Area					
• Permit well installation	ls	1	$1,000	$1,000	
• Install 4-in dia groundwater extraction wells to 80 ft bgs	ea	1	$6,000	$6,000	
• Develop groundwater extraction wells	ea	1	$500	$500	
• Pumps, gauges, controls, vaults, etc. for wellhead completion	ea	1	$5,000	$5,000	
• Lease roll-off bin	ls	1	$1,000	$1,000	
• Dispose of drill cuttings as a non-hazardous waste (5)	ton	2	$44	$107	
• Dispose of development water as non-hazardous waste	drum	3	$150	$450	
				$14,057	$14,057
Install Conveyance and Treatment System					
• Install above-grade conveyance piping	lf	100	$5	$500	
• Purchase and install air stripper with 20 gpm capacity	ls	1	$15,000	$15,000	
• Install system and controls at Oil Staging Area	ls	1	$5,000	$5,000	
				$20,500	$20,500
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$10,000	$10,000	
Prepare remedial design and implementation plan	ls	1	$10,000	$10,000	
Bid, award, and negotiate installation contracts	ls	1	$5,000	$5,000	
Obtain permit to discharge treated groundwater	ls	1	$5,000	$5,000	
• Construction Observation					
Provide resident engineer	day	5	$1,000	$5,000	
Provide office support	day	2	$400	$800	
Provide vehicles and equipment	day	5	$260	$1,300	
				$37,100	$37,100
Engineering Project Management					
• 10 percent of *Design and Construction Management Services*		10%	--	--	$3,710
Decommission Groundwater Extraction and Treatment System					
• Abandon 1 groundwater extraction well at Oil Staging Area (6)	ea	1	$2,000	$2,000	
• Remove air stripper, hoses, and appurtenances	ls	1	$2,000	$2,000	
				$4,000	$4,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	1	$1,000	$1,000	
Provide office support	day	0.5	$400	$200	
Provide vehicles and equipment	day	1	$260	$260	
				$3,460	$3,460

Table D-28

Estimated Capital Costs for Alternative 6 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$346
Abandon Soil Vapor/Groundwater Monitoring Wells					
• Abandon 3 soil vapor/groundwater or groundwater monitoring wells (6)	ea	4	$2,000	$8,000	
				$8,000	$8,000
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
• Construction observation					
Provide resident engineer	day	2	$1,000	$2,000	
Provide office support	day	1	$400	$400	
Provide vehicles and equipment	day	2	$260	$520	
				$4,920	$4,920
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$492
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$110,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$22,000*
Total Estimated Costs:					***$132,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Removal and disposal of concrete slab are assumed to be costs that will be incurred as part of building demolition and are not included herein.

(3) Approximate dimensions of containment sump are 7.67 feet long by 6.67 feet wide by 3.5 feet deep.

(4) Excavation is assumed to consist of PCE- and petroleum hydrocarbon-containing soil to a depth of 5 feet below the base of the containment sump and 5 feet of soil around the circumference of the sump to a depth of 5 feet below the bottom of the sump.

(5) Density of soil is assumed to be 1.5 tons per cubic yard.

(6) Abandonment assumes well casing is completely filled with a cement grout using a tremie pipe from the bottom of the well to approximately 5 feet below ground surface. The top 5 feet of the well casing is removed to prevent the abandoned well from being a subsurface obstruction.

Table D-29

Estimated Annual Costs for Alternative 6 - Oil Staging Area Excavate Subsurface Structures and Dispose Off-Site, Perform SVE in Soil, and Extract and Treat Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Perform SVE in Soil					
Operate and Monitor SVE System					
• Lease one 250 scfm blower	mo	12	$1,600	$19,200	
• Lease two 1,000 lb GAC contactors	mo	12	$600	$7,200	
• Provide electrical power for blower (2)	hp	10	$657	$6,570	
• Operate and maintain equipment	mo	12	$1,600	$19,200	
• Replace spent GAC (3)	lb	3,600	$1.68	$6,048	
• Transport and dispose of spent GAC by incineration	lb	3,600	$1.65	$5,940	
• Sample extraction wells and GAC influent and effluent monthly	ea	12	$600	$7,200	
• Analyze vapor samples for VOCs by EPA Method TO-15	ea	84	$300	$25,200	
• Conduct Site visit to monitor system performance	ea	26	$300	$7,800	
				$104,358	$104,358
Monitor Soil Vapor					
• Sample, and conduct mobile laboratory analysis of samples from vapor monitoring wells on quarterly basis	ea	4	$7,500	$30,000	
• Prepare quarterly report compiling soil vapor monitoring data	ea	4	$1,500	$6,000	
				$36,000	$36,000
Extract and Treat Groundwater					
Operate and Monitor Systems for One Year					
• Provide power to operate pump (4)	hp	2	$657	$1,314	
• Operate and monitor equipment	mo	12	$1,000	$12,000	
• Replace spent additional GAC	lb	2,000	$1.68	$3,360	
• Transport and dispose of spent GAC by incineration	lb	2,000	$1.65	$3,300	
• Collect quarterly sample of effluent from each extraction well	ea	4	$500	$2,000	
• Analyze quarterly efflent samples by EPA Method 8260 wells by EPA Method 8260	ea	2	$158	$316	
				$22,290	$22,290
Monitor Groundwater					
• Sample groundwater monitoring wells on quarterly basis	ea	4	$2,000	$8,000	
• Analyze groundwater samples					
VOCs (EPA Method 8260)	ea	15	$158	$2,372	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	15	$76	$1,139	
Selected metals (EPA Method 6010)	ea	15	$190	$2,846	
• Prepare quarterly report compiling groundwater monitoriing data	ea	4	$1,500	$6,000	
				$20,357	$20,357
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$183,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$37,000*
Total Estimated Costs:					***$220,000***

Notes

(1) Totals may not sum exactly due to rounding.
(2) Assumes one 10 hp blower.
(3) Assumes GAC usage rate of 300 lbs/month, based on current operation of SVE systems.
(4) Assumes one 2 hp pump.

Table D-30

Estimated Capital Costs for Alternative 2 - Building L Area
Excavate Soil and Dispose Off-Site, and No Action for Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
General Site Preparation					
• Mobilize contractor equipment and supplies to site	ls	1	$5,000	$5,000	
				$5,000	$5,000
Excavate One Foot of Impacted Soil in Building L Area					
• Remove and dispose of concrete/asphalt pavement (2)	--	--	--	--	
• Excavate impacted soil and stockpile for characterization	yd^3	1,500	$8	$12,000	
• Collect minimum of one confirmation soil sample per 2,500 ft^2 of floor surface area	ea	21	$200	$4,200	
• Analyze confirmation soil samples					
VOCs (EPA Method 8260)	ea	21	$158	$3,321	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	21	$76	$1,594	
Selected metals (EPA Method 6010)	ea	21	$190	$3,985	
• Collect one 4 point composite soil sample for disposal profile per 200 yd^3 of stockpiled soil	ea	8	$26	$208	
• Analyze disposal characterization samples					
VOCs (EPA Method 8260)	ea	8	$158	$1,265	
TPHd, with silica gel cleanup (EPA Method 8015M)	ea	8	$76	$607	
Selected metals (EPA Method 6010)	ea	8	$190	$1,518	
WET extraction	ea	8	$63	$506	
TCLP extraction	ea	8	$63	$506	
Selected metals in WET & TCLP extracts (EPA Method 6010)	ea	48	$32	$1,518	
• Load characterized soil into trucks (4)	ton	2,250	$5	$11,250	
• Transport and dispose of 50% of soil as non-RCRA hazardous waste	ton	1,125	$55	$61,875	
• Transport and dispose of 50% of soil as RCRA hazardous waste	ton	1,125	$135	$151,875	
• Pay California generator fees	ls	1	$61,000	$61,000	
• Import, place, and compact clean fill	yd^3	1,500	$25	$37,500	
				$354,727	$354,700
Design and Construction Management Services					
• Engineering					
Perform general planning activities	ls	1	$2,000	$2,000	
Prepare plans and specifications	ls	1	$2,000	$2,000	
• Construction Observation					
Provide resident engineer	day	10	$1,000	$10,000	
Provide office support	day	4	$400	$1,600	
Provide vehicles and equipment	day	10	$260	$2,600	
Conduct geotechnical and compaction testing	day	0.5	$650	$325	
Perform air monitoring	day	10	$200	$2,000	
Prepare completion report	ls	1	$10,000	$10,000	
				$30,525	$30,525

Table D-30

Estimated Capital Costs for Alternative 2 - Building L Area Excavate Soil and Dispose Off-Site, and No Action for Groundwater

Price Pfister, Inc., 13500 Paxton Street, Pacoima, California

Task Description	Estimated Costs				
	Unit	Quantity	Unit Cost	Subtotal	Total (1)
Engineering Project Management					
• 10 percent of Design and Construction Management Services	ls	10%	--	--	$3,053
Subtotal Estimated Costs (w/ contractor overhead and profit):					*$393,000*
Contingencies (assumed to be 20 percent of subtotal estimated costs):					*$79,000*
Total Estimated Costs:					***$470,000***

Notes

(1) Totals may not sum exactly due to rounding.

(2) Removal and disposal of pavement are assumed to be costs that will be incurred as part of demolition of buildings and other improvements at the Price Pfister property associated with redevelopment of the Site.

(3) Excavation is assumed to consist of black sand and soil containing metals and other chemicals of concern to a depth of 0.5 to 1 feet below ground surface.

(4) Density of excavated black sand and soil is assumed to be 1.5 tons per cubic yard.